JOURNAL OF GAS LIGHTING, WATER SUPPLY, &c.

EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

VOL. CXVI., No. 2530.—TUESDAY, NOVEMBER 7, 1911.

EDITORIAL NOTES—GAS, &c.

British Commercial Gas Association.

THE Committee to whom have been confided the preliminary organization of the representative and working arrangements of the British Commercial Gas Association are not letting grass grow under their feet. They have a justifiable belief in the potentialities of the body that has been instituted with the view of promoting the commercial interests of the gas industry in the matter of its staple commodity. From a set of circular-letters received yesterday, signed by the President of the Institution of Gas Engineers (Mr. R. G. Shadbolt), we learn that every gas undertaking in the country has had the present position placed fully before it; and those who have pledged themselves to subscribe on the basis agreed upon, have been asked to give certain matters their immediate attention, those who have promised to support the scheme partially are being urged to do so to the full extent of the standard line of contribution, and those who have not yet linked themselves up with the scheme are appealed to for favourable reconsideration. The founding of the new British Commercial Gas Association has so considerably altered the position that we feel any gas undertaking in the country that does not identify itself with the organization and the work, will be depriving itself of much direct opportunity, as well as of the consciousness of doing a part in the co-operative work of the gas industry.

No gas undertaking in the kingdom, it is hoped, is now without a copy of the constitution and rules of the Association as finally adopted; and with the copy in possession, information about the whole scheme is before them. We do not know of anything that at this stage can be more persuasive than the printed constitution and rules of the new organization. We therefore ask for them the very careful consideration of those to whom they specially appeal, and who are those who have not yet given their support, or only partial support, to the work now in hand; and the same careful consideration is desired from all to the circular-letters that have reached them from the Secretary (Mr. Walter T. Dunn). The pace at which the Committee having the preliminary and advisory work in hand can move will depend entirely on the activity of all the constituent members; and the quicker this preliminary work is accomplished, the sooner will the machinery be set in motion. Nominations for membership and for associate membership and financing are the first things to which the subscribers are requested to give attention, and next will follow the election of the General Committee.

Then those who have promised to support the scheme short of the standard line are earnestly requested to take the further step, not only on the grounds that the fullest co-operation will give the machinery the utmost opportunity for effective operation, but on that of equity. The objects of the Association are to organize, stimulate, and defend in every possible way the commercial side of the gas industry; and, in the words of the circular-letter before us "the benefits "accruing to the industry from the work of the Association "will be derived by the various undertakings in direct pro-"portion to their magnitude." Every gas undertaking has its part to do in the scheme; every gas undertaking will enjoy the fruits of the work. We cannot conceive of anything that could appeal with greater force to the sense of British equity than this movement. And if equity is not sufficiently persuasive, the scope of the work should be. The scope will be external and internal in the case of every supporting concern. About the external work, gas undertakings have been well informed; upon the internal work and influences, perhaps hardly sufficient emphasis has yet been laid. Through the annual meetings, through the conferences on sales organization, and through literature, the commercial officials of gas undertakings will find the Association of the greatest educational value. And no one can question that "the increased efficiency" of the commercial officers "will "result in material gain to the undertakings they serve."

All these arguments clearly appeal with equal appropriateness to those undertakings that have not enrolled themselves in the movement, which is in distinct accord with the commercial spirit of the times. Let the administrators on this further appeal again think over the matter; for we are convinced there is no board of directors or committee of a gas undertaking in this country who would not confess, if bound to give answer, that it would be easier for them to make out a case why they should give support to the scheme than one why they should not do so. Whatever the position of a gas undertaking in relation to the movement, all managements should ask themselves the question, What is the part that we have to perform in connection with the new organization? Having, by the aid of the circular-letters, determined what this part is, then——Please do it, and that without delay. The spirit of joint interest should dominate the scheme, and help it forward, with increasing strength, into the sphere of consolidated usefulness.

One word by way of criticism on a matter of detail. All the circular-letters before us are headed "The Institution "of Gas Engineers." Would it not be better in future that all matter concerning this subject should be headed "British "Commercial Gas Association"? The new Association ought, as it were, to be made to impress its individuality and aims by being set up on a pedestal of its own, with the Institution having a line in the inscription to indicate that the Association is under their wing.

The Gas Companies' Parliament.

THE number of questions of a legal and legislative character now raised and discussed at the meetings of the Gas Companies' Protection Association suggests that it is becoming a sort of Parliament on matters pertinent to its objects, and concerning very intimately the affairs of the gas industry. But it is a Parliament without the essential of legislative power, though we have a fair amount of faith that the gas industry and the public would be partners in even greater benefit than at present if the power of decreeing the laws governing gas supply were vested in such a body, instead of in the High Court of Parliament. However, a body with aims such as this grows in its usefulness in a way of which the members are barely conscious. If it were not for this body, several of the questions that were raised at the meeting yesterday week—under the chairmanship of Mr. H. E. Jones—would have had no platform upon which they could be properly discussed, and several of them would have no central channel through which collective action could be taken in connection with them. Talking of collective action, as we list the questions legal and legislative in which the gas industry is concerned at the present time, it is seen what a considerable whole they make; while if the management of an undertaking were to examine them singly, they might one by one be set aside, as something that, though forming an additional burden, must be borne without any individual action being taken in regard to them. Inspected collectively, and by the aid of collective mental capacity, the aspect of importance becomes far different. By amalgamation of dissimilar thought on the same topic, a broader view is invariably obtained, and the real significance of a thing is often thereby revealed where it would not be otherwise. In this we have one of the advantages of such an Association—it is the centre to which are attracted as a matter of course new experiences and new ideas in connection with those matters that properly come within its purview. It also provides driving force in connection with them; and matters adversely affecting the interests of the industry are sighted, and dealt with, within the range of the power of the Association, that, if there were no systematic watch maintained, might—through the legislative activity of opponents, and those who want to gain something at the expense of the industry—slip by unnoticed until too late.

Consider the subjects that were ventilated at last week's

meeting of the Association. In relation to land valuation and taxing, the question had been raised by Mr. Hanbury Thomas as to the payment of a large premium on the future sale of disused land by a gas company; while that premium ought, in his view, to go to the benefit of the undertaking and the gas consumers. The Association took action; but the Chancellor of the Exchequer would not receive a deputation, nor did he think there was any necessity to differentiate between gas and other lands that appreciated in value, and were the subject of sale. The Association could not go farther; but the question was raised. There is satisfaction, though unsuccessful, in having done all one can in trying to avert something that detrimentally threatens. Gas companies, too, have substantial grievances regarding the administration of, and practices surrounding, municipal electricity undertakings. The Association have made representation on the subject to the President of the Local Government Board; and he has asked the Committee to formulate their indictment for his consideration. This is now being done. Then both the Chairman and Mr. R. W. Edwards introduced some interesting matters relating to depreciation allowances in assessing for income-tax. On this question the Inland Revenue Authorities have taken, and are still taking, up an absurd position, and are through their action simply compelling the gas companies affected to prove the absurdity, and to establish their rights to the recognition of allowances that existed anterior to the issue of a certain famous circular. There can be no question as to the rights of gas companies to these allowances; and on appeal they are readily obtained when the case is properly submitted to the Income-Tax Commissioners. What makes matters worse, the local surveyors appear to be labouring in a state of perfect confusion in regard to the question. Mr. T. H. Hazell, of Newport, Mon., for instance, mentioned how his own Company have been refused an allowance for depreciation in respect of prepayment meters and fittings, because he could not show an English case where such an allowance has been granted on appeal to the Special Commissioners, though he has found Scotch and Irish cases. A paragraph on a subsequent page will probably assist him. To add to the mountain of difficulty that the Inland Revenue Authorities have managed to raise in connection with gas companies, Mr. Edwards cites how in the case of Aldershot it has been decided by the local "taxmasters" not to recognize as part of the general expenses of the undertaking the contributions to the special purposes fund—though the clause giving power to create the fund says "the Company "may, if they think fit, in any year appropriate out of the "revenue of the Company *as part of the expenditure on revenue "account*," &c.—but to subject those contributions to income-tax, and make an allowance when the money is actually spent. It seems that the Inland Revenue Authorities have been making a deliberate study of how to compel gas people to take the most circuitous route to obtain their legal rights. In these matters, to say the least, the authorities do not occupy a defensible or a glorious position.

In and through such matters, one sees examples of the useful and consultative sides of the co-operative efforts of such an organization. But one more illustration from the proceedings at the annual meeting will indicate the assistance the Association can be in individual cases in the cause of protecting the industry generally against the institution of precedent. With the Chairman of the Association, we exceedingly regret the easy way that, under the pressure of County Councils and other road authorities, some companies have consented to the insertion of clauses in Bills and Orders empowering the use of steam or other road rollers or appliances not exceeding a defined weight, and relieving the users thereof of all liability for damage. Those gas companies who have done this have sacrificed their common law rights in this matter, which rights Parliament have displayed their willingness to protect. Fortunately, such agreement does not constitute parliamentary precedent. If it did, those companies who have done this thing would have been exposed to the accusation of having betrayed the interests of the gas industry in this particular. But we know in this session how some of the smaller companies have been hotly pursued through Parliament by County Councils and other authorities in the attempt to obtain onerous terms in respect of the companies' use of roads; and no secret has been made of the fact that the idea is to create precedent for general application. One small company who introduced a Provisional Order this session were pressed vigorously by a County Council first before the Board of Trade and then through both Houses of Parliament, with the view of obtaining statutory enactment empowering the employment of a 20-ton roller, without liability attaching for any damage occasioned to the gas-pipes. If the County Council had succeeded in procuring the parliamentary recognition of a 20-ton roller, it would have been a serious precedent for gas companies to have to face. The successful resistance in this case was made easier for the small company concerned by monetary help rendered to them by the Committee of the Association, who recognized the unfairness of such a company standing single-handed, in a matter of principle of this kind, against an opponent with practically unlimited financial resources at their back. This is one of the most practical instances of individual and industrial protection that could be submitted by the Chairman as evidence of the value of the Association. Naturally (they cannot help it) the weakest gas companies for attack are the smallest ones; and it is as well local authorities should be made aware that the small companies have an Association to support them, who recognize that part of their business is to see there is no invasion of rights in matters of principle, and that the small companies are treated in a respectful and not an oppressive manner. After this instance of practical utility, we hope that many more of the companies of the lower magnitude will see that their names are enrolled as members of the organization.

Central Organization Work in America and at Home.

CONGRATULATIONS to our friends across the Atlantic on the character, technical and otherwise, of the proceedings at the annual meeting of the American Gas Institute, which was recently held under the presidency of Mr. Donald M'Donald. Year by year we are finding much more in common with them in their technical work than at one time of day was the case. In subject, thought, and practices, the gas men of this country, of Europe, and of America, are assembling technically closer and closer on level ground. Differences lie chiefly in the fact that on some subjects and in some practices one or other country is more advanced than the other. And where one country has progressed farther along the road in any subject or practice than the others, from that country the others can, as a rule, learn something. We know there is much on several subjects that we can learn from America, and they from us. Natural, geographical, national, and legislative conditions conduce to the differences; but even these are being partially eliminated by contemporary work directed to a common goal.

Over this work it is proper and right that the central organization of the industry should keep strict watch. The President has a high ideal of what should be the aspirations and objects of the American Institute. He desires that it should take the place in the gas profession and industry of an organization having the attributes of a social club, of a trades union, and of a society through which should be made known the various results of scientific research. We in this country believe in cultivating the social side in connection with our technical organizations. Friendships and the personal communion of men of like interests make for the strengthening of thought and action; and this, though it cannot be exactly appraised, is industrially beneficial. What the President means by a "trades union" is that the Institute present an organization which can show a united front for protection against unjust attacks through immature and ill-considered legislation. The American Gas Institute are able to occupy the position with greater strength than can the Institution of Gas Engineers in this country, partly on account of its broader constitution, but mainly from the fact that there are few municipal gas undertakings in America, and therefore the bulk of the membership represents company administration. Had this been the condition in this country, then there would have been less need for the Gas Companies' Protection Association. As it is, the Institution can only offer opposition to proposed legislation that is detrimental to the industry at large; but they are largely impotent in the matter of legislation that applies (say) only to companies as opposed to municipalities, and *vice versâ*. Some of the diverse work that the Gas Companies' Protection Association engage in, the Institution would not dare to touch, owing to its representation covering the two branches of administration. There is, however, much work common to both outside the purely technical, in which the Institution can take an active lead. With regard to Mr. M'Donald's view that the Institute should do their part in encouraging research work, and should be the channel for

its communication to the industry—leaving, however, the work itself to be done by gas companies, the Institute not engaging directly in it—we are inclined to agree with the Committee who considered the address that this would be a mistake. An active direct share in research work by the Institute would stimulate and guide private research, and would ensure the work being carried to a depth that might not otherwise obtain.

The review of the proceedings that is published in this issue shows that the technical matter before the members at their meeting had wide expanse. The papers treating of carbonization questions are dealt with in this issue; and those on other subjects will receive attention as opportunity permits. As anticipated, Dr. Bone, the Livesey Professor of Gas Engineering and Fuel at the Leeds University, had a cordial reception at the delivery of his lecture on "Surface "Combustion;" and there was rapt interest as he unfolded the possibilities in practical application of the developments he and his coadjutors have succeeded in making. The machinery has been set in motion that will confer on Dr. Bone honorary membership of the Institute. The honour of this dignified recognition will be very highly valued by the eminent recipient, and equally appreciated by the gas men of this country.

Carbonizing Experiences in America.

Our columns this week are flush again with material on carbonization questions; the bulk of it being contributed from America. The vertical retort is tentatively rearing itself in that country; and we hope to hear some good accounts of it, both on the intermittent and the continuous systems. But the two papers on the subject that are before us to-day—the one by Mr. Walter G. Africa, and the other by Mr. Carroll Miller—do not, on the surface, suggest any strikingly satisfactory experiences. This, however, may be due to the insufficiency of the information contained in their respective papers on which any fair judgment can be formed by any one who has not a living acquaintance with conditions and materials. The papers do not supply us with any idea, by analyses or otherwise, as to the character of the coals used; and there are no figures in them showing the comparative results with horizontal working. Perhaps our friends will favour us by supplementing the particulars, as, placing their workings side by side with experiences in this country and in Germany, the intermittent vertical retort in America (qualifying this remark by confessing to a total ignorance of the coal used) does not seem to be doing itself full justice. Both papers describe intermittent systems of working—Mr. Africa's of home design, and Mr. Miller's on the Dessau system.

There is only a moderate amount of structural information given in the papers. The first thing that strikes one is the small bottom dimensions of Mr. Africa's tapered retorts —only 16 in. by 22 in. He has experimented with several tapers; and he finds them all good, but he does not explain why he favoured the smallest outlet of all the tapers tried. The bottom opening of his retorts is much smaller than any in this country. Given alphabetically, the Dessaus at Sunderland are 13¾ in. by 27¼ in. at the bottom; the Glover-Wests at Manchester, 22 in. by 36 in.; and the Woodall-Duckhams at Burnley, 20 in. by 29 in. The point is only one of curiosity, as experience in this country is that a fairly considerable taper is preferable for facilitating the discharge of the retorts—a small taper when the inside of the retort becomes rough not being a suitable condition for freedom of discharge. Another point that is contrary to the practice in this country is that Mr. Africa leaves a space of 4 feet of heated retort above the coal for gas to pass through. To this space he attributes his "unusually high" illuminating power gas for vertical retort systems, inasmuch as he believes that, in the passage of gas through this heated space, the vapours are fixed, "which, in systems of full retorts, do not "reach the proper temperature for gasification." We were under the impression this notion had long been completely exploded, and that it had been universally accepted that the contact of the gas with the surfaces of the heated space tended to impoverish it, and otherwise injuriously affect it. Comparing the results in Mr. Africa's paper with those in Mr. Miller's (using the Dessau full retort), we do not find evidence of any superiority in the matter of illuminating power; and taking our high makes in this country into account, and Mr. Africa's comparatively low ones, we fail to see any advantage in the free space. But what we do see is a large amount of carbonizing space wasted. We believe his retorts are 18 ft. 6 in. long; and 4 feet per retort in an installation of eighteen retorts means the waste of a 72 feet run of carbonizing capacity—true in the smaller part of the retort. We cannot detect any justification for this in the results presented.

While gas makes are not high as judged by the results in this country with several varieties of coals, the candle powers and the gross calorific values in the case of both Mr. Africa and Mr. Miller are good. The tar production is the same; but the coal is either a poor ammonia-yielding one, or there is something inexplicable about the figures submitted. While we are talking, in vertical retort working at home, of 25 to 30 lbs. of sulphate of ammonia per ton of coal, 5 to 7 lbs. of ammonia per ton is being spoken of in these two American papers. There is nothing to complain about in the fuel accounts; but the figures shown have been beaten in this country. The temperature investigations that have been made by Mr. Miller are interesting; but the temperature variations to which he refers must be due to local circumstances. He mentions that the difficulty is sometimes experienced of charges hanging in the retorts, which, he thinks, are generally due to the extreme bottoms of the retorts being too cold. He also complains of the rapid formation of carbon in the retorts. These experiences are not experiences in this country or on the Continent; and therefore their existence points solely to local conditions being responsible. If this is so, what are the conditions, and are they incurable?

A third paper (which was also presented, as were the two upon which comment has been made, at the meeting of the American Gas Institute) was by Mr. Warren S. Blauvelt; and it brings information to date as to the development in the United States of bye-product coke-oven gas plant. This plant (which, of course, has its place bound by geographical and industrial circumstances) affords an apt illustration of the danger into which critics are likely to fall by judging of prospects too rigidly on past performances, and not making allowance for developments that may be born of experience. We have not much interest in the tale Mr. Blauvelt tells as to the course of development. Sufficient is the stage at which development has arrived. Scrutinizing that stage, criticism of the process, where it can be suitably and economically applied, would be futile and puerile against such a hard fact as that with which the present author introduces the subject in his paper. Twelve years have elapsed since the Everett plant of the New England Gas and Coke Company commenced the distribution and sale of illuminating and fuel gas. Meanwhile, the coke-oven plants engaging in the distribution of gas in the United States for illumination purposes have increased to eleven; and the total sales of coke-oven gas for town use had by 1910 advanced to upwards of 12,000 million cubic feet, or approximately (we must not forget the large carburetted water gas and natural gas supplies of the States) 23 per cent. of the total coal gas sold. There is no avoiding such a fact as this; and the weight of it would to-day effectually crush out any attack on, under apposite circumstances, the feasibility, the practicability, and the financial prudence of such a scheme. The main part of the paper is devoted to an account of the development of the Detroit bye-product recovery coke plant; and from the information it is seen how completely, in the production of surplus gas for distribution, both illuminating and calorific powers are under control. Requirement is merely subject to the will of those responsible for the gas supply; and at the coke-oven plant there is fulfilment. One interesting point as to satisfying domestic demands for coke where the metallurgical variety is produced. The coke is crushed for domestic purposes; and when it is said that in Detroit the sales of the crushed material have risen from 42,797 tons in 1908 to 150,000 tons in 1910, we have a fact that also speaks louder than words.

Industries and the Coal Reserve.

The warning words of Sir William Ramsay, in his Presidential Address to the British Association in the summer, as to the exhaustion of the economically workable coal supply being within measurable distance—say, about 175 years—and his advisory words that steps should be taken to conserve the national capital by preventing waste, and by close observation being kept on the rate of increased use, have led to the matter being raised in Parliament. It was introduced, in the form of a question to the Home Secretary by Mr. G. A. Touche, whose name will be recognized as that of one

of high standing in City circles, and of one who is not likely to be lightly shaken off by the shelter taken by the Home Secretary (Mr. M'Kenna) behind the last report of the Royal Commission on Coal Supplies, nor by a patent inclination not to be worried by a condition that cannot possibly injuriously affect the present generation. The Home Secretary may make up his mind that what Sir William Ramsay considered should be done, and what Mr. Touche has asked the Government whether they do not also think should be done—that is, to appoint a Committee to keep permanent watch over the subject, and to report on it from time to time, with the view to keeping the Government advised as to the situation—will be persevered with in the hope of gaining the desired end. Most of us are sufficiently patriotic not only to wish for a contemporary prosperity of the country, but to assist in doing in the present something that will be of material value to our successors. We recognize that the coal reserve is a fixed quantity. There is some limit to it, though we cannot exactly say what that limit is, as all estimates applying to invisible sources of supply must be more or less hypothetical. Our patriotic and precautionary senses therefore lead us to support the suggestion for the watching and advisory committee suggested; and it is to be hoped the Government will give the matter generous consideration. The appointment of a Committee with these objects cannot do anyone harm; and it will certainly add another plank to the national defences.

But in the consideration of this question, there are amateurs in regard to it who fling about their accusations of present waste of the coal resources in a manner that has a freedom properly measurable by their own ignorance in the matter. What we object to is that all coal-using industries of the country should be roped-in with those coal consumers—industrial and domestic—who are, as one paper has put it, "wantonly and mischievously" wasting the national substance by the crude use, with noxious results, to which they put the coal. No credit is given to the industries by many of the general newspaper writers, by the politicians, and by others who count themselves authorities on this subject for a more economical use of coal in their processes to-day than has ever been the case. Industrial fuel accounts everywhere are lower now than ever per unit of production. Industrial economics and self-interest demand that it should be so. Every pound of coal wasted represents so much less profit; and manufacturers just now are keenly alive to this. The necessary increase of coal by expansion of the industries cannot be stopped; for that expansion means the increase of the nation's affluence. The quarter in which there is great waste and mischievous effects in the use of coal is really in the domestic fire-grate. If the coal used there were dealt with in gas-works retorts, and fuel supplied to the domestic hearth in gaseous form, or in solid form as coke with the smoke-producing constituents removed, there would be a considerable gain to the nation which is at present dissipated from the exits of the chimneys of our dwelling-houses. It is agreed that the question is a vital one for our national future; and there is every willingness to support reasonable action in maintaining a watch over the country's supplies. There must, however, be no limitation to industrial use. And when the waste of resources, and the mischief done by such waste, are talked of, credit should be at the same time awarded where credit is due for an advancing economical consumption per unit of production.

Advertising Electricity.

One of the latest methods of obtaining cheap advertisements for electricity is to send round to the editors of provincial papers type-written sheets of "puff" paragraphs, of a more or less interesting and more or less truthful kind. These are accompanied by a note which reads:

> These sheets, giving brief accounts of the latest developments and inventions in the electrical industry of the United Kingdom, are sent for the convenience of editors, who are at liberty to use the items wholly or in part as desired. Their publication would oblige the Joint Committee of Electric Supply Authorities.

How far the editors of the various papers to whom these "brief accounts" are addressed will exercise the "liberty" of giving something for nothing by advertising electricity free, remains to be seen. It will not be surprising, however, to find that a vast amount of knowledge as to the varying uses and advantages of electricity has suddenly been acquired by the newspapers. The sheet sent out last week contained several paragraphs on the use of electricity in the dairy and on the farm, and others about an electric fan which has been fitted in the Queen's boudoir for drying Her Majesty's hair after washing, the use of electric fans for distributing perfume in rooms, and so on. There is also a paragraph setting out the marvels which "a pennyworth of electricity" will accomplish. The claims under this head are of the modest kind which would be expected from such a body as the Joint Committee of Electric Supply Authorities, among them being that the pennyworth of current will light a 25-candle power lamp for 32 hours, or cook a 12-lb. joint of meat. The Committee do not say at what price per unit electricity is to be supplied in order that a pennyworth may accomplish the marvels they set out. Still less do they say at how much cheaper a rate the same services might be obtained from gas. This could hardly be expected of them; and if the public are to learn it, those who are interested in the sale of gas must take measures similar to those adopted by the electricity authorities, to see that they are supplied with the information. There will be abundant work now and always for the British Commercial Gas Association in ensuring that people are supplied with facts.

Prepayment Fittings and Depreciation Allowance.

At the meeting of the Gas Companies' Protection Association last week, the question was raised, by Mr. T. H. Hazell, of Newport, Mon., as to whether there have been any cases before the Special Commissioners in which depreciation has been allowed for income-tax purposes in respect of prepayment meters and fittings. Inquiry has been made of Mr. William Cash and Mr. W. A. Schultz; and their replies convey ample affirmative information. Mr. Cash states that there have been two cases at least before the Special Commissioners of appeal from assessment where depreciation has been allowed on meters, stoves, and fittings. One is the Pinner Gas Company, the other the Brentford Gas Company. Mr. Schultz replies that he succeeded in obtaining depreciation for income-tax purposes in respect of stoves and meters, both prepayment and ordinary, in the cases of Dolgelly, Dysynni, and Barmouth before the Special Commissioners. Also a like allowance in Ireland at Armagh, Portadown, and Lurgan; and in England, before the Special Commissioners, in the case of the Grantham and the Grays Gas Companies. In the case of Grantham, however, the Commissioners gave the decision in Mr. Schultz's favour, providing that the Herne Bay case which was then before the Court confirmed it. The Herne Bay appeal, unfortunately for this provisional decision, was withdrawn. At Grays, the concession was obtained; but the Commissioners refused the total allowance for other reasons which are now the subject of appeal to the High Court. In settling the Welsh cases before the Special Commissioners in London, they stated that the rule was to allow 7½ per cent. on meters.

A Concrete Street Lighting Scheme for the City.

After the extended experimental contest in the City of London, it seems it is going to end in "a draw," and neither gas nor electricity will be able to claim a victory. A few words by Mr. J. Gunton, Chairman of the Streets Committee, in replying to a question at the last meeting of the Court of Common Council unfold three things—(1) That the Committee have adopted a report for early presentation in which a joint gas and electric lighting scheme will be recommended; (2) that the joint scheme will give about 50 per cent. more illumination in the City than under the present means of lighting; and (3) that the project will save several thousand pounds per annum. It would appear from this statement of features that, unless the Gaslight and Coke Company and the Electric Light Companies have been putting their heads together as in Holborn, the Committee have had a very difficult matter under judgment, owing to the greater economies and higher efficiencies of gas-lamps than ever in the history of artificial illuminants, and the necessity for making sharp and material sacrifices on the part of electrical undertakings in order to enable them to compete with gas. Having these points in view, and especially the fact that for long years the City of London Electric Lighting Company have been, for the bulk of the electric arc lamps in the City, drawing revenue to the tune of £26 per annum per lamp exquisitely demonstrating inefficiency, it is readily appreciated what excellent opportunity there is for saving, by supplanting waste and inefficiency, some thousands of pounds on the City lighting bill. Ordinary flame arcs are at present only being charged

at £17 10s., as against the £26 for, we believe, about 334 of the old type arcs. Modern efficiency would, of course, account for the increased lighting power. Central suspension and bracket lights are to displace standards in the City; and this is something that is, apparently, going to be made a point in the commendation of the new scheme.

Heavy Charges in Horizontals and Inclines.

The paper that Mr. Ernest Astbury read before the Manchester and District Junior Gas Association on Saturday is one of those contributions to the literature of carbonization that give so many succinctly-stated particulars that one finds it difficult to say much about them, unless it be in the way of comparison with contemporary working elsewhere, or in the way of comparison with other systems of operation. The notes are drawn from the carbonizing experiences at the Liverpool Gas Company's works; and there heavy charge operation, but not long duration carbonization, is practised—that is, in both the horizontal and the inclined retorts 10¼ cwt. charges are the rule, the duration of carbonization being limited to eight hours. The central feature of the communication is the comparison of the results of inclined and horizontal settings; and if this comparison constituted the final word for inclines, we should never again hear of anyone erecting inclined retorts in preference to horizontals, machine charged. It is indeed very rarely such information now comes to hand; and we are led to wonder whether any engineer will in future be prepared to put up an installation of inclines on the considerable scale in face of the position of horizontal and vertical working. In the results as to production and costs, even making the allowances Mr. Astbury indicates, the inclines are not, at Liverpool, the equals of the horizontals in the matter of economy and efficiency. There is one small point. We do not like titular contractions if there is any chance of error; and as the use of the terms "F. A." and "A. F." machines, being merely a reversal of the same letters, might at some time lead to the mistake of credit or otherwise being given to either the Fiddes-Aldridge or the Arrol-Foulis machines, it would perhaps be better to avoid them.

The Telpher and Coke Quenching.

There is another point in Mr. Astbury's paper upon which experiences in other places, where the telpher system of coke transport is employed, would be useful. On the telpher machine with its skip of coke quitting the retort-house, the quenching, of the coke is accomplished by immersion in a tank of water. At Liverpool, there is an objection to this method of quenching, on the ground that the coke is in danger of becoming saturated with water, and somewhat badly broken. The last time we had an opportunity of examining coke so quenched, it did not appear to be saturated, nor was it fissured in the excessive manner that we had expected it would be, by such treatment; and the draining, and the clouds of steam that arose as the coke was raised from the tank, suggested that there could not be much moisture remaining in the coke. However, at the Liverpool works, trial is being made of the effect of partial immersion by having a shallow depth of water in the tank, and a spray of fine jets of water (round the top of the tank) playing upon the coke. There is instruction to be gained by a study of Mr. Astbury's notes.

The Minimum Wage Question.

A further step was reached in the discussion of the miners' minimum wage question last Saturday, when a meeting of the South Wales Conciliation Board was held for the purpose of considering the matter. The result of the deliberations may not be much of a surprise; but it must increase the seriousness of the situation. Briefly, the answer of the coalowners to categorical questions put by the men's representatives was that they objected to the proposals put forward for the fixing of a minimum wage; that they were opposed to the minimum wage on principle; that they had no alternative proposals to make; and that they refused to vary the present agreement in any particular. Thus at the forthcoming national conference of miners, the delegates will have before them at any rate a point-blank refusal by the South Wales colliery owners to fall in with the minimum wage idea. Before the time arrives for the conference next Tuesday, it will be seen whether this lead is followed by the owners in other coalfields. So far, it is pointed out, no settlement has been made in any district; but it is thought that in certain cases an agreement between employers and employed is likely to be arrived at. These, however, will not affect the ultimate result, in view of the decision which was reached at the annual conference of the Miners' Federation of Great Britain a month ago. It may be remembered that it was then decided to start a national movement, backed with the full power of the Federation, for securing a minimum wage for colliery workers in all coal-fields. Failure in any district was to be followed by a general strike in support of that district. Well, there has been a failure in South Wales, and a bad one, too. In fact, the employers express themselves as "astounded" with the men's proposals, which, they urge, would if adopted, have the effect of closing a very large number of collieries in that area. In addition to this, they see no reason to go back upon the existing Conciliation Board agreement, which was only entered into eighteen months ago, and so has still three-and-a-half years to run.

Preparation and Discussion of Technical Papers.

An editorial note in the October number of the "Journal of the Society of Engineers" deals with the subject of papers intended for discussion before engineering and other societies. After emphasizing the value of these contributions to the proceedings of such bodies, the writer gives the following hints as to their preparation: "The use of dreary platitudes, the proposal of well-worn opinions in the place of facts, the parading of formulæ and statistics at great length, and similar errors of judgment, should have no place in a paper presented for serious consideration. The ideal paper should possess some clear purpose, lead to some definite conclusion, and possess a real force or inspiration which will challenge controversy, point the way to advancement, and suggest means of development." The writer adds that "the discussion of a paper should not include harsh, destructive censure, indiscriminate praise of the author and all his works, or the repetition of views already frequently expressed, but should rather be devoted to the expansion and amplification of the ideas proposed for consideration, by the addition of facts taken from experience, and to the elucidation of points which may not have been expressed with sufficient clearness."

Presentations to Mr. A. R. Egeler, of Vienna.

As readers of the "JOURNAL" will doubtless recollect, the concession of the Imperial Continental Gas Association for lighting the suburbs of Vienna will terminate at the end of the present year, when its business there will be liquidated. This will necessitate the retirement, on a pension, of Mr. A. R. Egeler, who has been the Association's Manager in Vienna since 1899. Mr. Egeler's connection with the Association dates from 1835; his father, Mr. A. R. Egeler, being the Engineer of the Association at Amsterdam from 1835 to 1879, from which post he retired, on a pension, after forty-four years' service. Mr. A. R. Egeler himself has served the Association in Belgium, Holland, and Austria. He entered as an apprentice at Ghent in 1870; and after serving his time was appointed Assistant Engineer there. He went from Ghent to Rotterdam as Assistant Engineer in October, 1881, and was afterwards transferred to Amsterdam, as Chief Assistant Engineer, in November, 1886. He had ten years' service there, and was then appointed Chief Assistant Engineer at Vienna in July, 1896—becoming Chief Engineer in October, 1899, on the death of Mr. Henry Drory. The Directors of the Association have signalized the occasion of Mr. Egeler's approaching retirement by presenting him with a handsome piece of plate—a copy, in silver, of the Warwick Vase—bearing the following inscription: "Presented to Antoine Rudolph Egeler, Esq., by the Board of the Imperial Continental Gas Association, in grateful recognition of faithful services rendered by him to the Association during a period of 41 years: 10th October, 1870—10th October, 1911." The presentation was made personally by two members of the Board—Sir Charles Jessel, Bart., and Colonel H. Le Roy-Lewis, D.S.O., at a complimentary dinner given by them on the 23rd ult. to the Vienna staff at the Hotel Bristol, Vienna. Mr. Egeler's colleagues and old friends have also presented him with an object of art, in token of their affectionate regard and esteem.

Physical Society's Annual Exhibition.—We learn from the Secretaries of the Physical Society of London that this exhibition will be held on Tuesday, the 19th prox., and will be open both in the afternoon and evening.

The London and Southern District Junior Gas Association will pay a visit next Saturday afternoon to the Old Kent Road Station of the South Metropolitan Gas Company. The members will assemble at the Asylum Road entrance at 3 o'clock. The next business meeting will be on Friday, the 24th inst., when Mr. Edward G. Stewart, of the Gaslight and Coke Company, will read a paper entitled "Carbonizing, with Special Reference to High Makes."

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 411.)

THE Stock Exchange had a rather chequered time last week, with alterations of light and shade according as hopes or fears might chance for the moment to prevail. But there was no strong movement apparent in any market, if we except one or two special speculative lines. The gilt-edged group continued firm; and Rails did pretty well, notwithstanding uneasiness as to labour questions. The week was cut in half by the closing of the Exchange on Wednesday for the usual clean-up. The opening day was dull and unpromising, and most of the leading markets were lower. Consols fell $\frac{1}{8}$; and Rails declined all round. Tuesday was not over-confident in the morning—both home and foreign affairs causing anxiety; but things cheered up later on. Consols were steady, Rails had a recovery, and Americans improved. Wednesday was quite an idle day. Thursday's reopening was quiet and cautious; but after a while markets gathered courage and got strong. Government issues were well supported, and Consols rose $\frac{5}{16}$. Rails advanced cheerfully in view of the apparent inability of the hot-heads of the Unions to engineer a strike declaration; and the other chief departments were stronger. Friday began in like mood; but the tone did not seem strong enough to stand firm when the usual Friday selling began, and prices slipped back a bit. Saturday was quiet and rather uneven. Rails were put out by the long protracted sitting of the Unions. Consols closed firm at 79 to 79¼—a gain of $\frac{1}{8}$ on the week. In the Money Market, the supply was again very plentiful, and rates were very easy. Discount terms moved slightly from time to time, but closed much the same as they had opened. Business in the Gas Market was fairly active and extensive; but—as not infrequently happens—the bulk of it was confined to two or three issues. Very few variations in quotation were made; but they were all augmentations. Conspicuous among these was Portsea Island, all three issues of which were put up with a generous hand. In Gaslight and Coke, the ordinary was active, and closely adherent to the prices of the previous week—viz., 104½ to 105¼. The secured issues were little touched; the maximum realizing from 85½ to 86½, the preference 102½ and 103¼, and the debenture 80¾. South Metropolitan was as quiet as in the week before, and changed hands at 116⅛ to 116¾. In Commercials, there was one bargain in the 4 per cent. at 110½, and one in the 3½ per cent. at 106. Among the Suburban and Provincial group, Alliance and Dublin was dealt in at 79½, Brentford new at 200 to 201, ditto debenture at 98¾, British at 45¼ and 45⅜, Lea Bridge at 128 and 128¼, and Portsea Island "B" at 126—after which the quotation was jumped up 9¼. On the local Exchanges, Liverpool "B" marked 164, and Sheffield "C" 239 and 239½. In the Continental companies, Imperial made 187 and 188 (a rise of 2), Union preference 137, European 19½ and 20, and Tuscan 8¾ and 8⅞. Among the undertakings of the remoter world, Bombay changed hands at 6⅜, Primitiva at 7⅜ to 7 9/16, ditto preference at 5 7/32 to 5 5/16, and ditto debenture at 97¾ and 98⅛.

ELECTRICITY SUPPLY MEMORANDA.

Criticisms of Olympia—Planning a Popular Exhibition—Public Distribution of Admission Tickets—Folly—The Bastian Hot-Box and Gas and Electricity Efficiencies for Heating and Cooking—Lamp Price-Cutting—The Weakly Fixed Price—Prepayment, and After-Demands.

OUR electrical friends seem to have some difficulty in getting the Olympia Exhibition out of their minds; and columns upon columns in the nature of criticism have been flowing since its close. If we had said half as much as has been said electrically after the show as to its failure in its main purpose, we should have had such hurtful epithets as "spiteful" and "cynical" hurled at our unintentionally offending heads. It depends upon the source of criticism rather than the keenness of what is actually said that upsets our techy friends. The "Electrical Review," while the exhibition was in full swing—that is to say, while it was in as full swing as it ever attained—did not look very benevolently upon the few daring electrical detractors of the management of the show. But now that the doors have been closed on the public, and the exhibitors have fulfilled the mournful task of carrying home the goods that were to have effected so much for their businesses, the "Review" admits to its columns an article by "Midland," which commences thus—"Olympia, 1911, has come—and gone. How much we had expected! But how much have we realized? The Exhibition had many good features; but none of salient merit. Its virtues were ordinary; but its defects were many, and of considerable importance." The writer ends: "Olympia, 1911, has been a woeful disappointment—far below the 1905 Exhibition, and in appearance, interest, and success, inferior to many non-electrical exhibitions occupying the same site since that date. Let us apply the lesson of our present disappointment to the future. 1917 is still far off. But, as it approaches, let us remember 1911, and to good effect." If the authorship of these phrases had rested in this quarter—but there, let us be thankful that someone else is responsible this time.

The writer of the article in question is of the opinion that ineffectual methods were adopted to attract the public to Olympia. But if we are to take him seriously, there was nothing there of "salient merit" to justify taking the public there; and what right have the electrical industry to attempt to inveigle the public to a show the "virtues" of which are "ordinary"? We are very much in accord with a correspondent of the "Engineering Supplement" of "The Times," signing himself "Atlantic," as well as with the writer of "Notes" in that paper, when they submit that nowadays an exhibition for industrial benefit is not needed for those who are technically informed or concerned in the particular industry. The object of an exhibition should be to nourish the root from which the prosperity of the industry is derived; and in the case of electricity, as in that of gas, the whole industrial edifice rests upon the sale of the staple commodity to the public. Therefore exhibitions "should be planned to educate the public, to familiarize them with what has been accomplished, and to bring before them in practical shape the results of the advance, indicating to them the various ways in which they may benefit from using what is exhibited." It must be a popular show. In another direction, "Atlantic," who has had experience of exhibitions "the other side of the herring pond," is very much of our way of thinking as to the part supply authorities should have in exhibitions of the kind. He says "the electric supply authorities should take an active part in the promotion and support of electrical exhibitions. The largest share of the permanent benefits of an electrical exhibition accrues to them; and they should be the leading supporters of such exhibitions, co-operating with electrical manufacturers. The electrical supply authorities, both private and municipal, should take extensive space in these exhibitions, and vie one with another in exhibiting, in the best and most attractive manner, the various applications of electric service." All who reap should take part in the sowing.

But there is one point upon which, in our opinion, exhibition organizers must not be too hard upon the supply authorities. The supply authorities are in the best possible position to get the public to such a display; but it is not right that the supply authorities should be compelled to pay for all the admission tickets they are in the position to distribute. The "Electrical Times" has been canvassing the exhibitors at Olympia to ascertain their views on the subject of the organization of the display; and there is a very general opinion abroad, in respect of this particular subject, that only those distributed tickets that are actually presented at the turnstiles should be paid for. This would enable a larger circulation of tickets, on which the name of the issuing undertaking or firm, and therefore the undertaking or firm responsible for payment, could easily be stamped. Another point that the electrical exhibitors are fairly well agreed upon is that the exhibits should be classified, and not scattered higgledy-piggledy about an exhibition. It is also thought the 2s. 6d. day was a mistake; it was also an error to turn out the main lighting of the hall at ten o'clock (we are not so sure about this under the circumstances); and we sympathize with those who complain about the mean advertisement illuminations on the front of Olympia. But then whence was the current to be obtained for something on a more magnificent scale? From the failures and disappointments of our friends, we can extract useful lessons for the exhibition in the Jubilee year of the Institution of Gas Engineers.

It is really cruel the way the writers of electrical encouragement week by week rub it into the gas industry that its days are numbered, and that it may as well make preparations to ensure a decent burial. The "Electrical Review" has said some singular things in its time touching this ghastly subject; but the dear old soul has now turned over a new leaf, and has adopted a sort of pitying attitude in a leader on the subject of "Publicity," which has been inspired by the floating of the British Commercial Gas Association. We learn from this article that—"The gas interests desire not only to extend their business, but to preserve that which they have—both *very difficult* to achieve in the face of the formidable competition of electricity. The contest between the two systems is so unequal, *owing to the great superiority of the electric current for lighting and power*, that it is *purely a question of good commercial management as to the rapidity with which the change-over will be accomplished*. The ultimate result is a foregone conclusion—in fact, as one of our contemporaries has put it, the weapons in competition are like a magazine rifle against a muzzle loader." While these good people continue to deceive themselves in this muddle-headed fashion, the gas industry will not lack for entertainment. But perhaps after all they are not deceiving themselves so much as trying to mislead others as to their real beliefs. Their literature, expensive exhibitions, and all else that they have done, and are doing, to catch the custom of the public show conclusively that the absorption of the ever-expanding business of the gas industry is not such a light and sure task (however agreeable it might be) as is pretended. Such folly and idle talk as we have referred to here does not sit well on the shoulders of any one of the senior electrical publications. Coming from boyish enthusiasts it might be excusable.

The hot-box of Mr. C. Orme Bastian is responsible for another letter in the "Electrical Engineer"—the inciting cause being our last criticism of his previous effort in the columns of our contemporary. He tells us that we only ventured a guess at the way in which the wonderful hot-box will operate. So far as our guess went, it was evidently not a bad shot, as he says that, "of course, there must be a certain percentage of loss." Just so. He would be an ignoramus on thermal matters who contended otherwise. But Mr. Bastian does not tell us how much the percentage of

loss will be, excepting that he remarks it will be "small, and totally insufficient to remove the scheme beyond the barrier of practicability." We are human enough to believe that Mr. Bastian looks with very generous eyes upon the performances of his own child. His letter omits one thing; and it is an explanation, on better lines than has hitherto been afforded, of the actual manner in which the hot-box will work. With regard to the comparative thermal value of gas and electricity, Mr. Bastian has a lordly contempt for the information imparted by the calorimeter. He looks upon such a test as only having academic interest. We go beyond that, and have respect for the test as showing us the ultimate relative thermal potency of the rival agents, and the scope that the two present for the improvement of practical efficiency. We will assume that (to use Mr. Bastian's words) "in practice the gases due to combustion are allowed to escape, sometimes taking with them 70 or 80 per cent. of the heat generated," while "the heat from electricity can be more efficiently controlled." On these assumptions, according to Mr. Bastian, "the cost of electricity" (we suppose he means at 1d. per unit) "can be made to compare with the cost of gas for heating and cooking." If this is so, we cannot see where the hot-box will come in, as it will not be necessary to introduce a further complication of the kind (which will sacrifice a certain percentage of the heat) into the consumers' installation. It was only when the first puff of wind brought the hot-box into notice—that was, as recently as September—that Mr. Bastian's view was (or we understand it was his view) that "in point of cost, electricity was not yet able to compete with gas in the household." Now he cuts adrift one of the main arguments for the hot-box. Perhaps it is well.

However, Mr. Bastian's own assertions show that the future hope of the electricity industry is beset by the dual danger that the gas industry has such a large field in which to operate in working for higher efficiency (which the electrical industry has not), and that the gas industry has still the option of adopting differential prices, as in the case of the electricity industry, as between heating and lighting gas. There is also a weakness about Mr. Bastian's relative efficiency argument. He does not inform us as to the nature of the tests he made, or the character of the appliances he used, to arrive at the 70 or 80 per cent. loss of heat in the case of gas; nor does he tell us the respective prices of the gas and electricity that he used. The tendency of the prices of gas to-day all through and about London is towards 2s. per 1000 cubic feet. Through the remarkable improvements in gas production, and the growth of business, and the operation of the sliding-scale of price and dividend, penny after penny is being shed for all purposes, while dividends are ascending. We tried the other week in the most friendly way to obtain from our electrical friends some account of the comparative tests that have, so it is insinuated, been made by them with gas and electric cooking appliances, with a description of the apparatus respectively employed, in order that similar comparative tests, if on scientific lines, might be made by competent gas people. But there has been no response—nothing but a dead silence. One other point in Mr. Bastian's criticism. He says that the writer of the "Memoranda" finds it impossible to believe that "0·5 foot per revolution" is written under the index of a gas-meter which, as a matter of fact, revolves once for every 5 feet, or ten times as much. It occurs to us that perhaps Mr. Bastian is ignorantly running up against the information that has nothing to do with the consumer whatever, but refers to the little drum of the meter used when testing the mechanism. He must not forget that every gas-meter in a consumer's house is tested and sealed by a testing authority appointed not by the gas suppliers, but under the authority of the Sales of Gas Act; and no meter is allowed to be used that has not been officially stamped. So much cannot be said for the electric meter.

The close of the exhibition at Olympia has been marked by a further reduction in the price of metallic filament lamps of all makes—the manufacturers being charitably inclined towards the electricity supply industry, and believing that the electric lighting business would receive a fillip by the prices of lamps being lowered by a few pence apiece. Of course, with such a number of makers in the field competing for business, it was not likely that a level line of prices would be maintained for any length of time. The split, however, has come earlier than anyone anticipated—the Brimsdown lamp people having already notified the electrical industry that they have reduced their rates a further 3d. per lamp. The result of this will be that the retail price of their high voltage lamps will be 2s. 9d. for the 25 to 50 candle power sizes, as against 3s. for the Osram and other lamps of the tungsten brand; while the low voltage ones will be 2s. 3d., instead of 2s. 6d. This extra concession in price will further upset the other makers' calculations, and lead to a fresh price-cutting war. If one were not able to put two and two together, it would be impossible to account for this fresh move, inasmuch as, before the recent drop in prices all along the line, the electricity supply industry was boasting that the lighting business of the gas industry was changing over with remarkable speed to the electricity industry. *If* this were true—and the gas industry knows well enough it is not, as do also the suppliers of electric current—there would have been no occasion to cut down the prices of the lamps that were producing this extraordinary transfer of business.

The experiment of the Eccles Corporation by which they, if we remember rightly, condemn the workmen tenants of twelve of their cottages to use electric light, at the fixed price of 6d. a week, has had a full year's spin, and evidently eleven out of the twelve tenants and their families have survived the nightly encircling gloom, whether by the supplement of some other form of artificial light is not so far known. The receipts, at 6d. per week, for the year after making allowance (11s. 6d.) for empties, amounted to £15 0s. 6d. Now a little paragraph that has gone the round gives the information that the cost of the electricity consumed was £14 17s. 11d. We find that 1150 units were used; so that the average price paid was 3·1d. per unit. Eight of the tenants had to pay for a new lamp each, which we take it would be 3s. However, the bald fact remains, putting the very best possible complexion on the position, that the eleven houses in the aggregate returned a "profit" of 2s. 8d. in the year; and there must have been a loss on the 23 weeks represented by empties, and by the capital expenses. In other words, the working returned a profit of 2·6d. per annum or 0·05d. per week per house. Several months have passed since we dealt with the scheme when in its nascent state and now we are told it resulted in a "profit" that cannot have much more than paid for the paper on which the accounts have been kept.

The electric prepayment meter has not got many friends; and it is scarcely ever heard of now. When it is, there is generally something disagreeable to say as to its character, and its general disposition to stray from the straight path of duty. A correspondent writes to the "Birmingham Express" to explain that he is a *pre*payment consumer of electricity. He inserts shillings in the slot of the meter. The collector calls periodically, takes the cash out of the box, and hands him a receipt for the amount. The correspondent adds: "I may not be the only one who thought his account settled, only to find that he receives a bill, giving credit for the amount taken from the meter, and a demand for nearly the same sum." The correspondent signs himself "Puzzled;" and small wonder!

A USEFUL MACHINE IN THE GAS OFFICE.

One of the prominent gas companies, we learn, has recently introduced a new system for dealing with a section of the clerical work of the office; and the arrangement has been so successful that it has reduced the work in this section by about one-half. It will, we feel sure, interest readers to learn how this great saving has been effected; and the secretary of the company in question has been good enough to give the necessary details for the benefit of our readers.

He says: "Hitherto our system of dealing with the fittings charges has been to keep separate books for each month of the quarter; the charges being entered up by hand from the fitters' job tickets, and subsequently debited on separate index-cards (showing date, day-book folio, and sub-totals), while later the consumers' fittings accounts were made out by a reference from the cards to the original entry in the fittings day-books. A little while ago my attention was drawn to the new adding and subtracting machine just marketed by the Remington Typewriter Company; and with the aid of this machine I saw an opportunity of doing the work in a much more effective and economical fashion. After a very thorough trial, the machine was purchased, and the new system put into practice.

"We now make out the consumers' fittings accounts direct from the job tickets, and simultaneously obtain a carbon copy on a leaf taken from a 'M'Millan' loose-leaf day-book; the items being all totalled up automatically by the machine.

"The invoices are vertically filed in road and district order; taken out again for other debits that may occur during the quarter; and on the completion of the whole of the accounts, they are entered in skeleton form on the cards—both being finally added and agreed. In addition to this, the combination of a typewriter and totalizer (for additions or subtractions) is of great assistance for other work in the offices.

"We hesitated somewhat in the first instance to adopt the new system, as of course everything depended upon the absolute accuracy and general dependability of the Remington machine. We have to admit, however, that the machine has proved in every way thoroughly satisfactory; and it has enabled us to show a great saving in labour from the old method of dealing with fittings charges, which has, of recent years, increased considerably."

We understand that the Remington Typewriter Company will willingly give all information that may be desired on this point, to any responsible official, free of any obligation or expense.

In the article under the heading of "Biographical Bypaths" which the Editor (Mr. W. T. Layton) contributes to the current number of the "Co-Partnership Journal" of the South Metropolitan Gas Company, some interesting particulars are given of the early history of the Company and of its first Engineer—Mr. George Holworthy Palmer. He had been a pupil of Samuel Clegg, the first Engineer of the Gaslight and Coke Company, and designed and superintended the construction of the original works in the Old Kent Road, which were opened towards the close of 1833. He left the Company in 1836, in consequence of a difference with the Managing-Director. He subsequently entered the service of the Equitable Company, and later that of the Western Company. In 1851, he was Engineer of the Sheffield Consumers' Gas Company. He died in 1868, in his 77th year.

PERSONAL.

Mr. W. T. Lancaster has resigned the management of the Ripon Corporation Gas-Works.

Mr. W. Arnott, Manager at the Cape of the South African Lighting Association, is taking a prolonged holiday; and Mr. J. W. Brown, Manager of the Chapel, Whaley, and District Gas Company, has been appointed to take charge of the works during Mr. Arnott's absence.

We are pleased to record that, on the proposition of the Minister of Commerce and Industry, M. Albert D. R. Ellissen, Managing-Director of the Compagnie Générale du Gaz pour la France et l'Etranger, and President of the Jury for Classes 74 and 75 of the Brussels Exhibition of 1910, has been nominated a Chevalier of the order of the Legion of Honour.

Mr. Walter T. Dunn, who until recently was Secretary of the Junior Institution of Engineers, has been honoured by the members electing him Chairman for the Institution year which commenced at the meeting on Monday last week. Mr. Dunn entering office had an ovation which emphasized the esteem he has accumulated about himself from the inception of the Institution.

In another column will be found an account of an interesting ceremony which followed a recent meeting of the Directors of the Elland-cum-Greetland Gas Company, when a portrait in oils of Mr. Robert Porter, the Company's Engineer, Manager, and Secretary, was unveiled in the Board-room by the Chairman (Rev. G. E. Aspinall, J.P.) and a replica was presented to Mrs. Porter. It is gratifying to record this recognition by Directors of long and faithful service, which has done much to place the Company in its present excellent position.

The employees at the Iron Bridge Gas-Works last Saturday presented Mr. Joseph Henry Jones, who had been Works Manager for 53 years, with a handsome cruet and an address, on the occasion of his retirement and marriage. Mr. Arthur C. Chubb, the Manager, in making the presentation, referred to Mr. Jones's long and good service with the Company, and said that during this period there had never been a failing in the supply of gas, nor had there been any fatality. Mr. Chubb also alluded to the good feeling which had always existed between Mr. Jones and the workpeople. Mr. S. D. Jackson, who has succeeded to the vacant position, proposed the health of Mr. and Mrs. Jones, and complimented the recipient on his excellent record with the Company. Mr. Jones suitably acknowledged the gifts and the compliments paid to him.

OBITUARY.

The death occurred last Friday, at her residence, Rotherfield, Henley-on-Thames, of Lady Makins, widow of Sir William Thomas Makins, Bart., for some years Governor of the Gaslight and Coke Company.

Mr. Henry Robinson, who for upwards of twenty years was Engineer to the Stockport Water Company, died last Tuesday at the age of 86. Mr. Robinson retired from the service of the Company a few years before the undertaking was purchased by the Stockport Corporation.

The death is announced of Mr. Watson M. Cowie, Manager of the Lockerbie Corporation Gas-Works, under somewhat tragic circumstances. Mr. Cowie and his sister resided in a house near to the works. At the end of the week before last, Miss Cowie went to Tillicoultry to visit her parents. Mr. Cowie was not seen during that week-end, and it was thought that he too had gone North. On the following Monday morning, however, a female servant who did not live in the house arrived, and observed through a window Mr. Cowie's body, partly clothed, lying on the floor of the bath-room. The police were sent for; and Mr. Cowie was found lying on his back, quite dead. Dr. Irving, after examining the body, gave it as his opinion that the deceased had become sick, and had been choked while vomiting. His father, Mr. R. Cowie, is the Gas Manager at Tillicoultry; and his brother, Mr. R. W. Cowie, whom he succeeded at Lockerbie three years ago, fills a similar position at Dalkeith.

We much regret to learn that the death occurred on the 29th ult., after a short illness, of Herr Emil Blum, Hon.Dr.Eng., the Managing-Director of the Berlin Anhalt Engineering Company (Bamag). Herr Blum founded the Company nearly forty years ago; and it has been mainly through his energy and ability that it has attained its present high position and immense magnitude. Apart from his great commercial ability, he had a sound technical knowledge of engineering, and of gas supply in particular. Readers of the "Journal" will remember that at the meeting of the German Association of Gas and Water Engineers at Dresden in June last he contributed to the proceedings an exhaustive paper on "Long Distance High-Pressure Gas Distribution" [see Vol. CXV., p. 102]. He had also been the author in recent years of papers contributed to "Technik und Wirtschaft," and other technical papers, on the control of the financial affairs of large industrial undertakings, on the advantages of workmen's advisory boards, and on the effect of tariffs on industry. He won the respect of all who came in contact with him, not merely for his great ability, but for his geniality and kindness.

AMERICAN GAS INSTITUTE.

Sixth Annual Meeting.

[From a Correspondent.]

In accordance with the arrangements previously announced in the "Journal," the sixth annual meeting of the American Gas Institute was held in St. Louis, Missouri, from the 18th to the 20th ult. About two hundred members responded to the call to order by the President, Mr. Donald M'Donald, of Louisville, at the opening of the proceedings on the morning of the first-named day; but before the close of the convention three hundred names had been registered—an attendance quite equal to the average of past years.

The members of the Institute were welcomed to St. Louis by the Mayor (Mr. F. H. Kreisman) in a speech in which he referred to the large part played by gas in adding to the comfort and convenience of every household, and to the fact—fortunate, in his opinion—that in America municipal gas-works were practically non-existent. To this address, which was concluded by the presentation of the freedom of the city, in the shape of a huge gilt key, proper response was made by Mr. E. G. Pratt.

The first business item was the presentation of the report of the Directors of the Institute. This showed a present membership of 1383; being a gain of 25 during the year. The financial statement was especially good, with a current surplus of $2542, which added to a previous balance of $4216 gave a surplus of $6858. Certainly, lack of funds cannot be averred as a reason if the Institute should fail to live up to its opportunities.

The Directors made a number of recommendations. They believe a start should be made towards the standardization of gas-works apparatus; that no new "wrinkles" should be sought next year, but instead a codification should be made of those already published; that a bulletin on matters of current interest should be sent at frequent intervals to members; and that an investigation should be made of the status of existing District Associations as yet unaffiliated with the Institute, to the end that such affiliation should be effected wherever possible. A monthly bulletin is one of the features of the National Commercial Gas Association; and apparently the average member of an association likes something all his own, instead of being content to get the same information at less expense from the pages of a gas publication.

The President's Address was directed mainly to the Institute and the work it had done and could do for its members and the industry. He considered that the Institute should possess in combination the attributes of a social club, a trade union, and a society for scientific research. The first provided friends; the second, a united front for protection against unjust attacks through ill-considered legislation; and the third, opportunity for imparting knowledge possessed by the few for the benefit of the many. Dwelling especially on this, the most important function of the Institute, he thought that research work should not be undertaken by the Institute, but by the individual companies, and given to the world through the Institute. Following the usual custom, the address was referred to a Committee of three for a report at a later session.

The Nominating Committee reported in favour of the following officers for the ensuing year, who were unanimously elected:—

President.—Mr. Ira C. Copley, Aurora.
First Vice-President.—Mr. V. F. Dewey, Grand Rapids.
Second Vice-President.—Mr. E. N. Wrightington, Boston.
Secretary and Treasurer.—Mr. G. G. Ramsdell, New York.

The election of Mr. Ramsdell as Secretary and Treasurer was occasioned by the resignation of Mr. A. B. Beadle.

After the appointment of a Committee to report on the place of next meeting, Mr. J. B. Klumpp gave an account of the work of the Calorimetry Committee during the past year, consisting mainly in the testing of several new types of calorimeters. He warned the meeting against a too ready acceptance of any recording calorimeter. He said the National Bureau of Standards had begun an investigation of calorimeters which so far had checked closely with the Committee's work, and which, when completed, would be of valuable assistance when State Commissions or other bodies desired to institute calorific standards.

Next followed the report of the Committee on Pipe Standards, presented by Mr. W. C. Morris. The adoption of this report is of much importance to both pipe users and makers in the country. Since 1898, a continual effort has been made to standardize all pipe and special castings used for gas work. In that year, and again in 1905, a standard was adopted by the American Gaslight Association; but little attention was paid to the matter by either user or maker. Now the pipe-founders stand committed to the standard just adopted; and there seems no reason to doubt that within a decade all existing patterns will be superseded by the new standard. Then castings may safely be kept in stock, to be ready when called for by an urgent order. Better workmanship will also result, for the larger foundries will be able to make up metal patterns.

The report of the Trustees of the Gas Educational Fund furnished interesting information as to the advancement secured by former pupils, largely due to the benefit obtained from the correspondence school carried on the Trustees.

The Committees appointed to award the Beal Medal for the

best paper read at the meetings of 1909 and 1910 respectively reported as follows: 1909: Mr. C. J. Ramsburg, on "Sulphur Compounds in Illuminating Gas." 1910: Mr. H. W. Alrich, on "Brick, Concrete, and Steel Holder Tanks."

The Institute then listened to Mr. L. R. Dutton, on the subject of "Commercial Motor Delivery: Cost and Results." This paper presented valuable data showing how extensively during the past two years electric and gasoline waggons have been purchased by gas companies. With the present rapid improvement in all types of motor waggons, the substitution of power for horse traction will proceed at a rapidly accelerating pace; for, notwithstanding the set-backs inseparable from any departure from old-time methods, the economy and other advantages already gained are indisputable, and the great American scrap-heap will soon contain the gas company's horse and waggon. This paper ended the morning session.

In the afternoon, the Institute members had the choice of attending at either of two section meetings. Section A, with the President in the chair, considered the following papers: "Some Principles of Condensation, with Especial Reference to Water Gas," by L. E. Worthing. "Production and Market for Ammonia Products": (*a*) "Plants for Sulphate of Ammonia," by Mr. C. G. Atwater; (*b*) "The Production and Market for Sulphate of Ammonia," by Mr. W. N. M'Ilravy; (*c*) "Sulphate of Ammonia, Some Details of Manufacture," by Mr. Howell Fisher; (*d*) "Bibliography," by Mr. A. B. Way. I have here grouped these papers, because those on the subject of ammonia were discussed at one time. Space will not permit of an abstract being given of either papers or discussion.

Section B, under the guidance of the First Vice-President (Mr. W. Cullen Morris), listened to a talk on "Insulation as a Means of Minimizing Electrolysis," by Mr. B. M'Collum, of the Bureau of Standards. It dealt with work of importance to those companies who suffer from electrolysis; and it will be printed as a paper in the "Transactions" of the Institute. A resolution was passed to the effect that the Directors co-operate with the Bureau of Standards in this matter. Then followed "Actual Leakage in Unaccounted-for Gas," by Mr. J. D. Von Maur—a plea for a more rational expression of unaccounted-for gas than in terms of send-out or per mile of main; for, as the author pointed out, leakage does not vary with send-out, and services are more apt to leak than mains. In a paper on "The Flow of Gas in Mains," Mr. J. W. Batten described some results obtained with a Pitot tube. Both sections discussed the "Wrinkles" and the report of the Bureau of Information; distribution topics being considered in Section B and manufacturing questions in Section A. With these the afternoon session ended.

On Thursday morning (Oct. 19), Section A heard "Notes on the Development of a Bye-Product Coke-Oven Gas Plant," by Mr. W. S. Blauvelt; "Operation of Verticals in Providence," by Mr. Carroll Miller; "Vertical Retorts at Manchester (N.H.)," by Mr. W. G. Africa; and "A Survey of American Gas Photometry," by Mr. C. O. Bond. The discussion on the first paper between advocates of different systems of carbonization occupied most of the morning session; but time was still found to listen to several Committee reports.

The Committee on the President's Address did not entirely agree with his recommendation that no research work should be done directly under the Institute's auspices. The Committee on Thermal Value and Candle Power recommended the appointment of three delegates to the International Photometric Committee; the incorporation in the proceedings of the Institute of a synopsis of the work already done by the Committee; and an investigation by the Bureau of Standards for the determination of a standard test burner or burners for photometric work. The Committee on the place of next meeting recommended Atlantic City; and their report was adopted.

Section B was occupied on Thursday morning with a paper on "Tar and Tar Products," by Mr. A. D. Whittaker. It was an interesting account of one company's success in disposing of their output, especially in the line of road use. Then came a communication on "The Centrifugal Compressor in the Manufacture of Gas," by Mr. L. C. Loewenstein—a subject very ably presented by the author, and describing a distinct advance in compressors. The session closed with a paper on "District Holders," by Mr. R. G. Griswold, where the author put forward a plea for outlying holders.

On Thursday afternoon, the Institute met as one body to listen to the most interesting event of the meeting. This was the lecture on "Surface Combustion," by Professor W. A. Bone—a repetition of the one delivered in June before the Institution of Gas Engineers. Those of us who had read the lecture in the "JOURNAL" knew something of what to expect. All, however, were intensely interested; and many minds are now busily engaged in thinking over the practical applications of the new system to our industrial requirements. Appreciation of the lecture was keen throughout, as was manifested by frequent applause. Readers of the "JOURNAL" will be glad to know that the necessary machinery has been started towards making Professor Bone an honorary member of the Institute.

In the evening, the customary banquet was held; and it proved to be more than usually novel and entertaining, owing to the cleverness and hard work of the Local Arrangements Committee. On Friday, there was a steamboat trip of over twenty miles on the Mississippi, to its junction with the Missouri. In this trip the ladies who had accompanied their husbands joined; and music and dancing made the day a pleasant one, despite a raw wind and drizzling rain. A short business session was held on the boat, at which the usual resolutions of thanks were passed.

The meeting, as a whole, should be considered as a successful one. The social features, especially for the ladies, who on Wednesday and Thursday were entertained in many ways, were exceptionally good. Old friendships were renewed, and new friends made. From a technical standpoint, the papers read are worthy of reperusal. By dividing into sections, more time was obtained; and this being utilized in discussion added to the value of the papers. Some just criticism could be made of the business management of the meeting; but it is believed that next year we shall profit by this year's mistakes.

COOKING BY GAS.

GUIDED thereto by a large and prominently fixed gas-sign, crowds of people during last week visited the Royal Horticultural Hall in Vincent Square, Westminster, where there was being held the annual Cookery and Food Exhibition; and it at once occurs to one that a gas-sign constitutes a peculiarly appropriate method of drawing attention to such a show, seeing how closely allied together are good cooking and gas. Last week's exhibition was the twenty-second of the series organized by the Universal Cookery and Food Association, with the avowed object of awakening public interest in the art of cookery, and placing it in a position worthy of its increasingly vital importance to national health and progress. This is a laudable aim; and the attendances would seem to indicate that it is widely appreciated. A universal exhibition, it appeals to a universal audience; and there is no reason why, as succeeding years come round, there should be any lessening of the popularity which the fixture has until now enjoyed. The advances of science are great, and ofttimes startling; but there are no present indications that questions regarding food and cookery generally are likely to lose their importance for the human race. In the appliances for preparing food for the table, however, there are frequent improvements to be noted, and methods, too, are subject to change. As to the latter, one need only refer to the interest which has lately been aroused in the housewife on the subject of cooking in paper bags—a process the advantages of which are now as eagerly debated as a short time ago were the merits of "Standard" bread.

The large variety of food exhibited, and the culinary literature, may be passed over here; but not so the section dealing with kitchen and dining-room accessories, &c., for these have a close connection with the gas industry. Anyone who, at this time of day, requires to be convinced of the invaluable help which gas can render in the practice of the gentle art of cooking, could have had this conviction forced upon him (or her) by a visit to the Horticultural Hall last week. There were also many competitions; and two special sections were devoted to condensed milk cookery and banana cookery. On Wednesday, for example, the arrangements included an elementary schools competition, an "Express" paper-bag cookery demonstration, a naval cookery competition, a lecture entitled "A Popular Study of Bacteria in Relation to Food," an army cookery competition, a special demonstration on fruit candies, a second army cookery competition, a military hospital cookery competition, a demonstration of dishes cooked in paper bags, a lecture on sugar and marzipan modelling, a demonstration of a *recherché* supper, a piping competition, a fish cooking competition, and a sauce making competition. And this was only one of the five days during which the exhibition remained open! The majority of the competitions were held in the annexe to the main hall, where there were installed for the purpose four of Main's double gas-cookers and one of Ewart's "Califont's" for supplying hot water—all fitted up by the Gaslight and Coke Company. In the army cookery competition, there was a champion shield offered as a challenge prize to the regiment obtaining the highest number of marks; and for the navy competition there was a similar shield, for the detachment securing the most marks. The same remark applies also to the schools competition. The Shipping Federation, Limited, had an exhibit of seamen's provisions and demonstrations of nautical cookery; and in connection with the latter, it was noted that the men were as much at home with the Main double gas-cooker fitted up for them as they would be with the solid-fuel fires usually found on board ship.

The largest collection of gas appliances was, however, to be found on the first floor, in the excellent model kitchen which had been fitted up by the Gaslight and Coke Company. This was the scene of demonstrations (of which examples are quoted above) which were witnessed by appreciative audiences. A small charge for admission was made by the Cookery and Food Association; but the general experience was that there were more applicants for admission than there were seats to accommodate them. On Wednesday evening, when the writer visited the model kitchen, there was in progress a cookery demonstration by a French *chef;* the dishes being cooked in paper bags. Full details of the process were supplied by Mr. F. Nicholls, a "Daily Express" *chef*, who was plied with questions which clearly showed how great was the interest taken by the ladies present in this method of cooking. It seems that almost anything solid which needs to be cooked may undergo the operation in a paper bag; and very tempting, too, when uncovered were the dishes that had been prepared by

the cunning hand of the French *chef* and cooked in the gas-ovens. In glancing round the contents of the kitchen, which the audiences had ample opportunity for admiring during the demonstrations, one noticed a Sugg "Criterion" gas kitchener, a Wright "New Century" cooker, and a Main "Kent" cooker, as well as a Fletcher-Russell vegetable steamer. In one corner there stood a Potterton "Victor" gas-boiler, which supplied the hot-water required; and there were also a Wilson and Mathieson "W.M." gas-heated washing copper and a Fletcher-Russell gas-heated smoothing-iron heater and irons. Another thing which attracted attention was one of Still and Sons' "Metropole" toasters with hot closet, one of the objects of which is to secure a saving in gas when the appliance is not actually in use. The drawing out of the grid half-way automatically shuts down the gas on to a bye-pass; and, when required for use, the action of putting the grid again into position immediately turns up the gas. This automatic action is controlled by a lever at the side of the apparatus. There are two grids fitted; and on the top of the toaster a hot closet is fixed, so that the waste heat may be utilized for keeping joints or plates hot. The kitchen was provided with one of Wright's eight-coil "St. Andrew" radiators, fitted with a steam-heated towel-rail, and illuminated by means of eleven New Inverted Company's burners, which were lighted and extinguished on the Telephos system. A complete range of copper cooking utensils was furnished by Messrs. Still and Sons. Before leaving this excellent collection of gas-cooking and water-heating appliances, reference may be made to the plumbing work in connection with the latter, which was carried out on the Amalgaline system of the Metal Jointing Company, Limited, who contend that it saves a great deal of time and material. The Amalgaline method of jointing is executed by fitting closely together the two surfaces that have to be united. The surfaces are cleaned, and between them is placed a metal ribbon 0·002 inch thick, treated with a composition. The surfaces are kept in close contact while heat is applied by means of a blow-lamp until the ribbon melts, which melting occurs at a lower temperature than the melting-point of lead. When this takes place, the two opposing surfaces of lead fuse or run together; the resultant joint being then undistinguishable from the solid lead, and being also unbreakable. The scientific importance of the invention, it is pointed out, consists in the fact that, by intermolecular absorption, the minute quantity of Amalgaline is dissipated in the body of the lead, which, by reason of the absorption, becomes stronger at the junction than elsewhere. This increase of strength has been proved by a series of tests.

Turning to the body of the hall, it may be remarked that Messrs. R. & A. Main had a stand, where visitors could inspect the firm's cookers, fires, radiators, &c., and see paper-bag cookery in progress in a "Kent" cooker. Then Messrs. Arden Hill and Co. exhibited the "Janus" gas-oven for bread baking and confectionery, which is heated from the outside, in such a manner that the heat is uniform, and no products of combustion get inside the oven or come into contact with the contents. There was an "Acme" gas-cooker; and at this stall, also, paper-bag cookery could be seen in operation. The firm's other apparatus on view included a "Zenith" automatic high-pressure boiler. Gas-heated boilers in various styles were shown by Jackson Boilers, Limited, and Messrs. Still and Sons. At numerous of the food-stuff stands, gas-cookers of different makes were in use; and the fact that gas can be used for practical cooking, with perfect ease and safety, in such small confined spaces as were available, is certainly a further point in its favour.

Coal Supply in the Future.

In an address, dealing with the British coal supply, delivered before the Sheffield Society of Engineers and Metallurgists by Professor Percy F. Kendall, F.G.S., of Leeds University, he said it had been stated that it was only a question of a few years or generations before accessible coal would be exhausted, and that they would have to go deeper and deeper, and that the cost of recovery would be so enhanced as to make coal a prohibitive luxury. The Yorkshire coalfield was an assurance against the near event of such a catastrophe. While nearly all the other coalfields in Great Britain were worked up to almost their full capacity, the Yorkshire coalfield stood alone in having a capacity for increase for many generations. He therefore thought that Sheffield, dependent as it was upon the proximity of a larger supply of cheap coal, could rest secure in the prospect that for many hundreds of years to come such a supply would not fail her. Interviewed on the subject by the representative of a London evening paper, Sir William Ramsay made some interesting comments on the address. He suggested that if Professor Kendall were to give an estimate of the increase available in the Yorkshire coalfield, it would be simple to calculate the greater length of time that would elapse before the supply of coal is exhausted. Personally, he very much doubted if it would amount to more than 25 years; and this, added to his own estimate, would extend the period to 200 or 210 years. Of course, if new coal supplies were found, as they appeared to have been in Buckinghamshire, the period mentioned in his Presidential Address to the British Association would be lengthened. Sir William added that there had been a misunderstanding with reference to his calculation that the supply of coal would last 175 years. In an address to a gathering of gas engineers, it was stated that if the present rate of coal consumption continued the supply would last 400 years. This was perfectly true, but his point was that the rate was regularly increasing.

SUTTON'S VOLUMETRIC ANALYSIS REVISED.*

THE value attached by all analysts to Sutton's "Handbook of Volumetric Analysis" may be realized from the fact that, since its first appearance in 1863, nine editions in English, comprising 15,750 copies, have been called for. The appearance of the tenth edition, embodying numerous alterations and additions, marks, therefore, an event of considerable importance in analytical circles. The venerable author, at the age of four-score years, has felt it necessary to leave the preparation of this new edition entirely in the hands of his son and Mr. A. E. Johnson, both of whom had collaborated in the revision of the ninth edition.

The revision of the work may, therefore, be discussed without fear of wounding the susceptibilities of Mr. Francis Sutton, who presented to analytical chemists a standard handbook of methods of volumetric analysis, which in all its earlier editions reflected the ripest experience and fullest knowledge of the day in regard to them. Now while the work still remains the standard text-book of the subject, it has not been kept by the present editors really abreast of progress in several branches of it. Some of its failings in this respect will be indicated in this review; and as the author is looking forward to witnessing the early publication of the eleventh and jubilee edition of the work, we may express a hope that in that edition the handbook will be restored to its pristine pride of place and intrinsic worth by a more thorough pruning and a good deal of re-writing. The revision of the present edition can be regarded as satisfactory only in respect of the re-calculation of the factors, &c., employed, which are now based on the latest tables of atomic weights and physical constants.

For the information of junior chemists who may not have used "Sutton" hitherto, and for convenience in indicating to others the more important changes introduced in the present edition, we will refer briefly to the scope of the volume and the arrangement of its contents. It is divided into seven principal parts, which are followed by some useful tables and an index. The first part—on the general principles of volumetric analysis—has been brought up-to-date by references to the present practice at the Reichsanstalt and at Bushey House in regard to the limits of error admitted in apparatus which is passed as standard at these institutions.

Part II. of the book is on "Alkalimetry and Acidimetry," and starts with an account of indicators, which, though considerably modernized since the issue of the previous edition of the work, is scarcely based on the latest views regarding the nature and behaviour of these all-important agents in volumetric analysis. For most practical purposes, however, the treatment accorded to the subject in the present volume will be found adequate. The preparation of standard solutions of acids and alkalis is described in a masterly manner, as also are the more simple titrations for which such solutions suffice alone. Among these are included Hehner's method for the determination of both the temporary and permanent hardness of water, the determination of ammonia in gas liquor and commercial salts of ammonia, and carbonate in commercial lime. A procedure for the complete analysis of ammoniacal liquor—based mainly on the methods described in recent reports of the Chief Inspector of Alkali Works—is given in detail. There is a description of Pettenkofer's method for the determination of carbonic acid in air, with various modifications introduced by later workers; but Haldane's volumetric method, which has been in use for many years past on a very extensive scale, is not even mentioned. This is one of the most serious omissions from the book.

Passing on to the third part of the work, which is on analysis by oxidation or reduction, the treatment there given is general; and particular applications of oxidation and reduction methods are reserved for description later, under their appropriate headings. The same remark applies broadly to the fourth part, which deals with analysis by precipitation.

With Part V. we come to the application of the principles described earlier to the analysis of special substances, many of which, however, are of no very direct interest to the gas-works' chemist. The latter, however, will find of value the directions given for the analysis of commercial ferrocyanides, and for the estimation of sulphocyanide. The determination of iron in iron ores is fully dealt with, and the procedures given may prove useful in the analysis of bog oxide and artificial purifying materials containing ferric hydroxide. The methods for the estimation of manganese will interest the much smaller section of gas chemists who are brought in touch with Weldon mud. Portions of the pages devoted to the determination of sulphur and the separation of sulphur compounds may also be useful to a number of our readers. Mohr's method for the estimation of sulphuretted hydrogen in coal gas by means of arsenious acid is described; and it is rightly pointed out that difficulties arise in its application when crude gas containing a large proportion of the impurity has to be examined. François's method for determining aniline, depending on its conversion to tribromaniline, is given, together with modifications of it introduced by other analysts. Some additions have been made, since the previous edition, to the account of volumetric methods for the determination of phenols.

* A Systematic Handbook of Volumetric Analysis; or the Quantitative Determination of Chemical Substances by Measure, applied to Liquids, Solids, and Gases. By Francis Sutton, F.I.C., F.C.S., Public Analyst for the County of Norfolk, &c. Tenth Edition, revised throughout, with numerous additions, by W. Lincolne Sutton, F.I.C., Public Analyst for the County of Suffolk, Norwich, Ipswich, &c., and Alfred E. Johnson, B.Sc.Lond., F.I.C., A.R.C.Sc.I. London: J. & A. Churchill; 1911.

The sixth part of the work includes the analysis of natural waters and sewage. This branch of volumetric analysis has always been handled in "Sutton" in a masterly manner, and a good deal of new matter has now been introduced. Certain criticisms which we are about to make on the apparatus described in the succeeding part of the volume which treats of gas analysis apply, however, to the apparatus described for the analysis of the gas collected in connection with the determination of the organic carbon and nitrogen in waters. Nevertheless, this part of the book remains unequalled by other writers on the subject.

The volumetric analysis of gases is dealt with in the seventh and final part of the volume. Time was when "Sutton" was recognized, in virtue of this part, as one of the best, if not the very best, standard work on gas analysis. Unfortunately, no serious effort has been made in recent editions to keep it abreast of modern methods of technical gas analysis. A very antique form of the Macleod-Frankland apparatus continues to be described as the standard apparatus for exact analyses, and no reference is made to the modifications by Bone and Wheeler, and others, which have immensely increased the speed and precision of the analysis of gases. Neither are some other important and much used forms of apparatus for the exact analysis of gas referred to. An illustration given of the procedure to be followed in making a determination of the proportion of oxygen in a sample of atmospheric air is simply ludicrous when viewed in the light of modern practice. It would serve no useful purpose to criticize in detail this part of the volume. It should either be rewritten or omitted altogether from the next edition, in order to prevent the whole book suffering from the taint of its obsolete character.

The work concludes, as heretofore, with a number of useful tables, and an index, which might, with advantage, be made more comprehensive. Some blank pages are left for notes. The general arrangement of the volume is good; and, having regard to the immense number of figures and formulæ given, it appears to be singularly free from printer's errors. Subject to a reservation in respect of the part on gas analysis, we consider the new edition of "Sutton" is practically indispensable to the analyst.

STATISTICS OF WORKMEN'S COMPENSATION.

THERE were noticed in the number of the "JOURNAL" for Oct. 24 (p. 237) some of the principal points from the first part of the Home Office Blue-Book for 1910 on the Workmen's Compensation and Employers' Liability Acts. That part dealt with statistics as to compensation paid under the Compensation Act of 1906 in seven great industries. In the second part of the Blue-Book there is to be found the usual information with regard to the general administration of the 1906 Act and the Employers' Liability Act of 1880. These statistics are divided into three sections, covering respectively England and Wales, Scotland, and Ireland.

Turning in the first place to England and Wales, it is noticed that in the year 1910 the number of cases actually dealt with under the Workmen's Compensation Act of 1906 by County Court Judges and by County Court Arbitrators was 4848; and of these 4550 were decided by Judges, and 88 by Special Arbitrators, while 210 were settled by the acceptance of money paid into Court. In addition to the cases adjudicated on, there were 1818 that were withdrawn, settled out of Court, or otherwise disposed of in such a way as not to enable the officials of the Court to state definitely the results. This makes the total number of cases taken into Court, under the 1906 Act, 6666—as against 6188 in the previous year. There were, however, besides the cases under the 1906 Act, a small number outstanding under the earlier Acts which were also dealt with. In 135 of the cases last year, compensation was claimed for incapacity due to industrial disease. As to the decisions arrived at, it may be stated that, of the claims settled within the cognizance of the Courts, the decision in 3186 cases was in favour of the applicant, and in 676 in favour of the respondent. Thus the proportion of successful claims was 82 per cent., as compared with 79 per cent. in 1909. The number of cases in which compensation was awarded under this Act on account of the death of workers was 1133; and in all except five of them the deceased had left dependants. Excluding these five, the total amount of compensation awarded in the 1128 cases was £190,696, or an average of £169 per case. These figures compare with 741 cases in 1909, with a total award of £117,844, or an average of £159 per case. Of the cases last year in which compensation was awarded to dependants, there were 406 in which sums of less than £150 were awarded—viz., cases of partial dependency—the total amount being £26,493, or an average of £65 5s. per case.

With reference to the cases of injury, the assignment of a weekly sum was once more the most general method of compensation adopted; there having been, under the 1906 Act, 1418 cases in which a weekly payment was fixed, as compared with 635 in which the compensation was returned as consisting of a lump sum. In 162 of the cases in which a lump sum was paid, the plaintiff accepted money paid into Court; while in the majority of the remaining instances a lump sum appears to have been awarded by consent of the parties. The average amount of the compensation was £28 4s. 8d. In the instances in which a weekly payment was awarded, the average compensation was, for cases of total incapacity 11s. 11d. a week; of partial incapacity, 9s. 2d. The cases taken into Court in 1910 are classified under the usual seventeen heads; the list and the number of cases under each head being as follows: Professional employments, 26; commercial occupations, 18; shop assistants, 166; domestic servants, 452; seamen, 340; fishermen, 12; agriculture, 344; building, 702; factories and workshops, 1906; docks, wharves, and quays, 338; mines, 1504; quarries, 80; constructional work (excluding building), 146; railways, 144; inland transport by road, 397; ditto by water, 37; miscellaneous, 54. Compared with the previous year, these figures show an increase of about 250 under mines.

The next table sets forth instances in which memoranda were registered in County Courts, having reference to cases settled by agreement, by committees, or by arbitrators; but these cases represent only a small proportion of those in which compensation is settled by agreement. According to the table, the registrations under the 1906 Act of cases settled were: By agreement, 20,680; by committee of employers and employed, 69; and by an arbitrator, 5. In these agreed cases, the average compensation to dependants in connection with fatal accidents was £172; and the average weekly payment in cases of incapacity, 13s. 1d. The number of cases of incapacity under the Act of 1906 in which the memorandum registered was for a lump sum and not a weekly payment, was 4516, as against 6553 in which a weekly payment was agreed upon. In addition to the 4516 cases in which the original agreement was for a lump sum, there were 6638 in which memoranda for the redemption of weekly payments by a lump sum were registered. The average lump sum payment over the 4516 cases was £35 13s. 3d.; but the figures under the different classes of employment vary greatly. Docks, wharves, and quays, as usual, show the lowest average lump sum payments for incapacity accidents in connection therewith (£13 12s. 1d.); while mines are at the top of the list (£74 3s. 10d.), and next come quarries (£61 19s. 9d.). Factories and workshops, under which heading are included 1504 of the cases of commutation, have an average of £40 9s., as against £29 18s. 1d. in 1909.

We come now to the Employers' Liability Act, which is dealt with in the report upon as nearly as possible the same lines as the Compensation Act, but in a simpler manner—firstly, because all cases except those removed to the High Court are decided by the County Court (there are no arbitrators), and, secondly, because the damages awarded can always be stated as a lump sum. Of the 48 cases under the Employers' Liability Act in 1910 in which judgment was given for the plaintiff, one only was a fatal accident; the compensation awarded being £250. There were 36 cases involving total incapacity; the compensation being £2210, or an average of £61 per case. Then there were eleven cases of partial incapacity; the compensation being £825, or an average of £75 per case. In 20 cases judgment was entered for the defendant; and 94 are stated to have been "otherwise disposed of." Thus there was a total of 162 cases under the Act last year. In fourteen of these cases, though the proceedings were originally taken under the Employers' Liability Act, the question of compensation was actually determined under the Compensation Act. The amount of damages in case of death recovered last year under the Employers' Liability Act was (as already stated) £250, as compared with an average of about £169 under the Compensation Act. The solicitors' costs were, however, heavier under the former Act than under the latter.

The number of cases carried in 1910 to the Court of Appeal in England was 136 (as compared with 135 in 1909), or just under 2 per cent. of the cases that came before the County Courts. Of these, 59 were appeals by workmen, 76 by employers (including one by an employer as against a third party), and one by third parties. The successful appeals were seven by workmen twenty by employers; while 36 were abandoned, withdrawn, or settled out of court before hearing. There were nine appeals to the House of Lords; the workman being the appellant in seven cases, five of which were successful. There was also an appeal to the High Court by a workman under the Employers' Liability Act, which was successful, and one by the employer to the House of Lords from the decision of the Divisional Court, which was dismissed. Out of 101 Compensation Act cases where the point on which the appeal arose is known, 25 turned on the meaning of the words "accident arising out of, and in the course of, the employment." In six actions, the definition of the term "dependant" or "part dependant" was in question; and in five others, the definition of the word "workman." In five cases, also, the point was whether death was due to accident or disease.

On the subject of the Scottish returns, it may be said that the number of cases taken into Court in 1910 under the Compensation Acts was 1533 (compared with 1205 the previous year); and under the Employers' Liability Act, 53. The average amount of compensation paid in cases of death where dependants were left was £176 8s. 4d. in cases decided in Sheriffs' Courts under the Compensation Acts, and £172 5s. 5d. where memoranda were registered. In cases of incapacity, the lump sum figures were respectively £9 12s. 11d. and £16 2s. 9d.; and the weekly payments, 12s. 5d. and 12s. 10d.

Last year in Ireland there were 1044 cases taken into Court under the Compensation Acts (compared with 920 the previous year); and two under the Employers' Liability Act. The average amount of compensation in cases of death where dependants were left was £126 4s. when decided in the County Courts under the Compensation Acts, and £141 1s. 9d. where memoranda were registered. In cases of incapacity, the lump sum figures that were awarded were respectively £23 8s. 3d. and £25 5s.; the weekly payments, 8s. 3d. and 8s. 11d.

WATER LEGISLATION FOR 1911.

In preceding issues of the "Journal," the principal features of the Gas Acts of the present session have been noticed. We now deal with the measures relating to water supply; taking first those applying to companies.

The Chester Water Act sanctions and confirms the construction of the existing works of the Chester Water Company, and authorizes the carrying out of new works, the raising of more money, and consolidation of the existing capital. The present works consist of the intake used by the Company for abstracting or diverting water from the River Dee, and the main or mains or pipes laid from the point of abstraction to the pumping-station at Barrel Well, Boughton. For a period of twelve months after the passing of the Act, the Company are to make tests of the amount of chlorine in the water of the river above the weir at Chester which is subject to tidal influence, and supply to the Corporation weekly copies of the records of such tests. After the completion of the reservoir authorized by the Act, the Company are not to abstract any water from the river for such period after the tide has flowed over the weir as, having regard to the tests so taken, shall be agreed upon between the Corporation and the Company; any difference between them to be referred to the Medical Officer of Health for the county of Chester. The purchase of certain lands situate in the parish and county borough of Chester, now in private occupation, is confirmed. Authority is given to construct and maintain additional works, consisting of a subsiding tank or reservoir to be constructed on land near the Eaton Road, leading from Chester to Eccleston, and an aqueduct, conduit, or line or lines of pipes commencing at the intended reservoir, and terminating by a junction with an existing main of the Company. No water taken from the Dee is to be supplied unless it has already passed through filtering apparatus approved by the Corporation, placed between the intake and the reservoir, and has been stored for a period of not less than fourteen days, and thereafter effectually filtered according to the best known methods. The Company may modify the construction of the reservoir; but in no case is its capacity to be less than 57 million gallons. Any contravention of these provisions is to render the Company liable to a penalty not exceeding £10 a day. When the reservoir has been completed, the use of the wells at Barrel Well is to be discontinued, and no water is to be supplied therefrom, except with the previous consent of the Medical Officer of Health for the city in case of emergency arising from failure of any of the Company's works, and in no case unless the water has been effectually filtered. The Corporation may take summary proceedings to enforce these provisions, and authorize persons to enter the Company's property to inspect the intake, reservoir, and any of the filter-beds and other appliances and take samples of water. As soon as practicable after the passing of the Act, the Company are to enlarge their reservoirs for holding filtered water, so that the quantity that may be stored shall not be less than one million gallons. The Company are allowed five years for the completion of the works—being a year less than they applied for. The Act authorizes the Company to make bye-laws for preventing waste, to sell or let meters, and to supply water in bulk; and it contains provisions protecting the Corporations of Chester, Liverpool, and Birkenhead, the Dee Conservancy and Fishery Boards, the Huntington Estate, and the Duke of Westminster. Authority is given to convert the existing stocks and shares of the Company; the substituted stocks to be held on the same trusts as the others. The Company asked to be allowed to raise additional capital not exceeding £80,000, by the issue of ordinary or preference stock; and they have been granted £75,000. They may, after Dec. 31, 1911, borrow in respect of the converted capital any sum or sums not exceeding (inclusive of £14,550 already borrowed under the powers of their Acts of 1857 and 1874) the sum of £24,000, and one-third of the amount of additional capital; also to create debenture stock, subject to the provisions of the Companies Clauses Act, 1863. [*Parliamentary Agents: Messrs. Sherwood and Co.*]

The Ely Rural District Water Act incorporates the Ely Rural District Water Company, and confers upon them power to construct works and supply water within a certain specified area in the rural district of Ely. The capital of the Company is £30,000, in £1 shares; and authority is given to borrow to the extent of one-third, and to create and issue debenture stock. The Company are authorized to construct a well and pumping-station in the parish of Wilburton; a well, pumping-station, and water-tower in the parish of Haddenham; a line or lines of pipes in the parishes of Coveney and Downham; and a reservoir or water-tower in the parish of Littleport. The works are to be commenced within three years, and completed within five years, from the passing of the Act. The rates at which water is to be supplied for domestic purposes are based upon the rateable value of the premises; starting at 8s. 8d. where this does not exceed £5 per annum, and rising to 5 per cent. when it is above £100. Additional closets and fixed baths are to be extras. Where the supply is by meter, the rate is to be at the most 1s. 6d. per 1000 gallons. Power is given to sell water in bulk for supply beyond the limits specified in the Act. Provision is made for the protection of wells in the neighbourhood of the Company's pumping-station, and also for the purchase of the undertaking by the Ely Rural District Council at any time after 25 years from the passing of the Act. The price to be paid is to be a gross sum representing the market value of the concern, without any allowance whatever for compulsory purchase. [*Parliamentary Agents: Messrs. Baker and Co.*]

The Felixstowe and Walton Water Act confers upon the Felixstowe and Walton Water Company authority to construct additional works, consisting of a pumping-station in the parishes of Rushmere St. Andrew and Foxhall, another wholly in the latter parish, a covered service reservoir in the parish of Purdis Farm, and three pipe-lines. Confirmation is given for the construction of the Company's existing pumping-station in the parish of Trimley St. Martin and the pipes now laid down. The protecting provisions in regard to wells referred to in the preceding paragraph are included in the Act. The Company may raise additional capital not exceeding £42,000 (including premiums), by the issue of either ordinary or preference shares, to borrow to the extent of one-third, and create debenture stock. The dividend is limited to 7 per cent. upon the ordinary and 6 per cent. upon the preference capital. [*Parliamentary Agents: Messrs. Dyson and Co.*]

The Luton Water Act gives the Company authority to acquire additional land by agreement for the general purposes of their undertaking, and to raise more capital. The quantity of land is not to exceed 6 acres in extent; and its use is to be restricted to the erection of buildings. The amount of additional capital granted is £100,000, to be issued as consolidated ordinary stock, to rank *pari passu* with the existing stock; and it is, of course, to be sold by auction or tender. Power to borrow to the extent of one-third, and to issue debenture stock, is given—the dividend not to exceed 4 per cent. per annum, without the consent of the Board of Trade. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

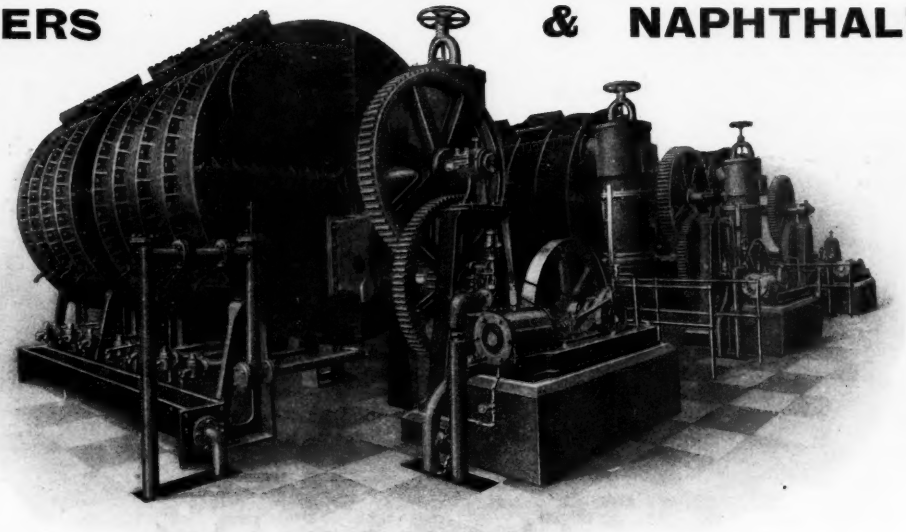
By the West Cheshire Water Act, the West Cheshire Water Company obtain legislative sanction for their existing works in the hundred of Wirral and county of Chester, and also authority to raise additional capital. The works comprise a well and pumping station in the township of Prenton, boreholes and a pumping-station (the Hooton) in the township of Childer Thornton, a water-tower in the parish of Heswall, and a pumping-main or line of pipes commencing in Prenton and terminating at the water-tower just mentioned. From and after Nov. 1, 1912, all water supplied from the Hooton pumping-station is to be softened; and the Company's works are to be open to inspection by a person authorized by the Council of the County Palatine of Chester. The amount of additional capital granted is £47,500, including premiums, to be entitled to a dividend of 7 per cent. per annum if raised as ordinary capital, or 5 per cent. if as preference. Power is given to borrow to the extent of one-third of the amount of capital actually raised at the time of borrowing, as well as to issue debenture stock. Not more than 5 per cent. per annum is to be paid on money raised on mortgage or debentures, without the sanction of the Board of Trade. The Act contains provisions for the protection of the local authorities within the Company's limits of supply, the Corporation of Birkenhead, the Cheshire County Council, and the Ellesmere Port and Whitby Urban District Council. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

The Wirral Water Company's Act sanctions and confirms the construction of their works, which consist of a pumping-main or line of pipes in the township of Prenton, already referred to in connection with the Act of the West Cheshire Water Company, and two reservoirs in the same township. The Company are authorized to raise additional capital to the amount of £5000, inclusive of premiums, to be entitled to 7 or 5 per cent. per annum according as it is issued as ordinary or preference capital; and also to borrow to the extent of £16,666 in respect of the original capital of £50,000 existing at the time of the passing of the Act, and £1666 in respect of the additional capital. No part of the last-mentioned sum is, however, to be borrowed until the whole of the additional capital, with premiums, has been paid up. The limit of interest on money raised on mortgage or debentures is 5 per cent. per annum, unless the Board of Trade sanction payment of a higher rate. Protective provisions similar to those contained in the West Cheshire Water Act are included in the Act under notice; and the Cheshire County Council and the Corporation of Birkenhead are further protected by the provision relating to the softening of water referred to in the notice of the first-named Act. [*Parliamentary Agents: Messrs. W. & W. M. Bell.*]

Concrete Tanks for Storing Ammonia.—Two concrete ammonia storage-tanks, built for the Gas Company at Ann Arbor (Mich.), have a common wall. According to some particulars given in "Engineering Record," the larger tank, 40 ft. by 10 ft. 1½ in. by 13 ft. 2 in. deep, has a capacity of 27,853 gallons; while the smaller one, used for concentrated liquor, is 30 ft. by 8 ft. 1½ in., of similar depth, and has a capacity of 17,091 gallons. As the tanks were built underground, where quicksand and water were encountered, it was necessary to sink a pit outside the excavation, and lay drains under the entire tank bottom, pumping from the pit during the period of construction. Two inches of concrete, containing stone of ⅜-inch diameter or less, was first laid, and then covered with a coarser concrete. After this bottom was in, the sides and top were run without a break in the work. Both tanks are reinforced with trussed bars, laid in both directions, and bent rods carried from the bottom into the sides and common wall. The walls were finally roughened on the inside, and, after a thorough cleaning, were whitewashed with neat cement, and plastered with a light coat of two parts sand and one part cement. Though these tanks were built in 1909, they have remained absolutely tight. The total cost was $1687, or 3·7c. per gallon of storage.

EFFICIENT WASHING PLANT.

HOLMES' WASHERS FOR AMMONIA & NAPHTHALENE.



An Installation at a Colonial Gas-Works—including Two Repeat Orders.

TOTAL CAPACITY, 7,500,000 Cub. Ft. per Day.

W. C. HOLMES & CO., LTD., *Sole Makers,* HUDDERSFIELD.

NOTICE.

Full Particulars regarding the MERRIFIELD-WESTCOTT-PEARSON Water Gas Plants may be had on application to the Patentees at

19, ABINGDON STREET, WESTMINSTER, S.W.

GODIN'S STOVES.

BURNING COKE, **COST 3d. for 24 Hours.**

***A Consulting Engineer writes:*—**

"**GODIN'S COKE STOVES** deserve the attention of Gas Companies, especially during the present high price of household coal, and good **COKE STOVES** ought to be in the Show-Room of all Gas Companies."

Godin's Stoves have been sold for over 60 years all over the World, largely in FRANCE, GERMANY, AMERICA, &c.

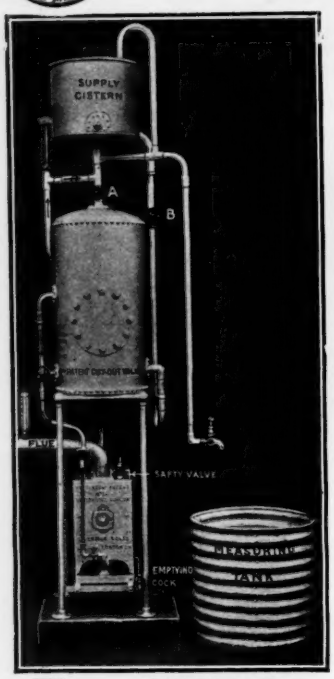
A. G. CLOAKE,

54, HOLBORN VIADUCT, LONDON, E.C.

Heating Capacity 3,500 Cubic Feet **54s.**

VICTOR GAS BOILERS.

AWARDED TO THOS POTTERTON FOR GAS HEATED HOT-WATER SYSTEM LONDON. 1905.



The "VICTOR"
Complete Testing Plant, as fitted at the L.C.C. School of Building, Ferndale Road, Brixton, for the instruction of students.

'Victor' Boilers are made in fourteen varieties, with three ranges of capacities, each design being provided to meet a particular purpose, either in regard to connection or position, so that every convenience for their satisfactory installation is afforded.

The most practical advice and assistance is rendered to gas companies in all matters relating to water heating.

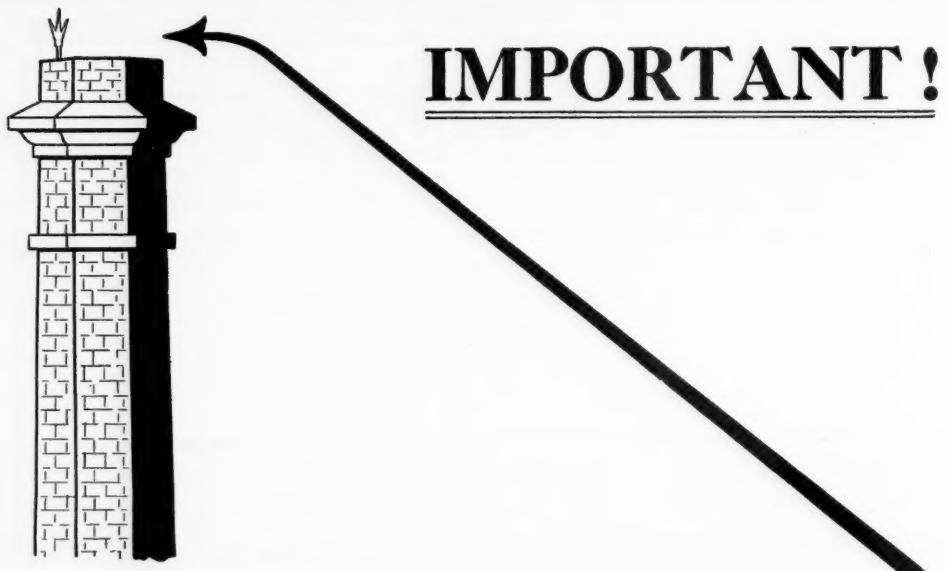
Thomas Potterton,

Heating Engineer,

Cavendish Works (near Assembly Rooms),

Telephone: BATTERSEA 969 & 969A.
Telegrams: "POTTERTON LONDON."

BALHAM, London.



IMPORTANT!

NO WASTE UP THERE

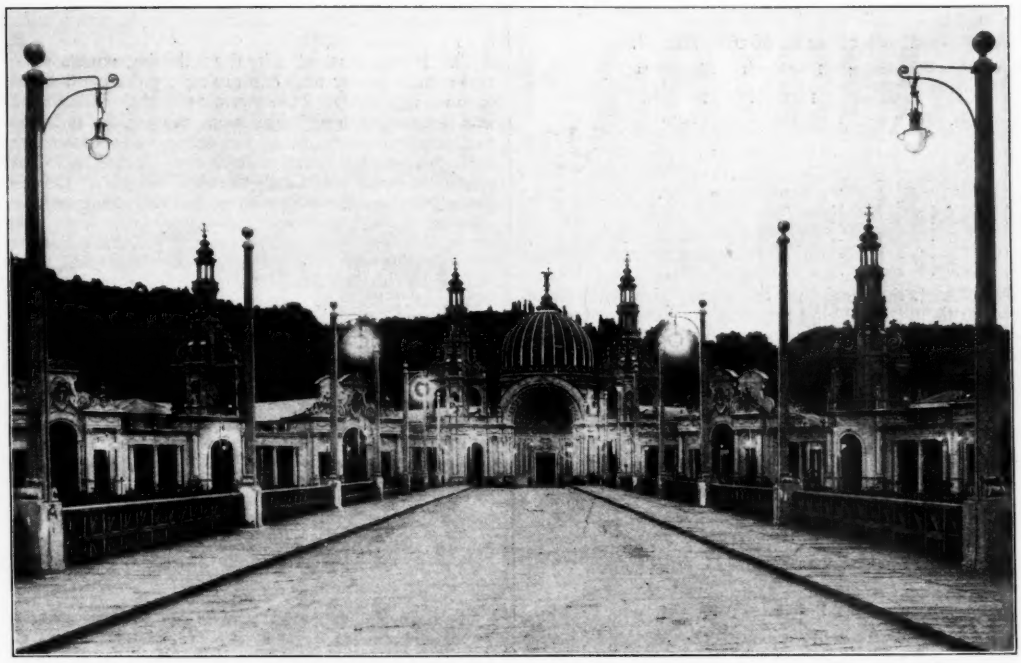
WITH

BROOKE'S PATENT REGENERATORS.

SOLE AGENTS: **ROBERT DEMPSTER & SONS, LTD.,**

ELLAND.

ILLUSTRATIONS & DESCRIPTIVE SPECIFICATION WILL BE SENT ON APPLICATION.



The "Pharos" High-Pressure Gas-Lighting at the Turin Exhibition.

[See last week's "JOURNAL," p. 308.]

UNSTABLE HYDROCARBONS IN LIGHTING GAS.

This was the subject of a paper by Mr. E. C. JONES, Chief Engineer of the Gas Department of the California Gas and Electric Corporation, San Francisco, submitted at the last meeting of the Pacific Coast Gas Association. He made the following remarks.

A quest for a remedy for naphthalene deposits led the writer to experiment with the use of crude petroleum and distillates for scrubbing gas for the removal of naphthalene. This work was begun with latent prejudice born of early experience in making coal gas, when it was an axiom of the craft that the finished gas must not be brought in contact with oil, because of the disastrous effects upon its candle power. This knowledge of the havoc wrought by oil upon the unstable illuminants of coal gas precluded its use in gasholder tanks and seals for the purpose of preventing freezing of the water. This was sane reasoning, because the substitution of crude petroleum for water in a scrubber of the Standard type would reduce an 18-candle coal gas to a practically non-luminous gas; and candle power of coal gas is too difficult to attain to warrant the sacrificing of any part of it.

The first series of experiments to determine the action of petroleum upon candle power was conducted by passing the gas slowly through a dip scrubber; the gas going through a sleeve perforated with holes 3-32nds of an inch diameter, and breaking a seal 1½ inches deep of oil. The gas made one passage through this oil seal, and then went direct to the bar photometer for test. A large sample of gas stored in a test holder was taken for this purpose, and the candle power of each sample was found. California crude petroleum of 16·5° Baumé was used for the tests, and the oil for scrubbing was heated to different temperatures, to endeavour to find out whether heating the oil would cause it to remove naphthalene without destroying the illuminating power of the gas. The following are the results of tests made with oil gas and mixtures of oil gas and lamp black water gas:

No. of Test.	Temperature of Oil. Deg. Fahr.	Candle Power before Scrubbing.	Candle Power after Scrubbing.	Loss in Illuminating Power. Candles.
1	87	21·3	17·4	3·9
2	100	21·1	16·9	4·2
3	163	20·5	16·9	3·6
4	130	19·4	16·9	2·5
5	130	19·6	17·1	2·5
6	130	17·4	13·5	3·9
7	130	17·4	13·4	4·0
8	130	17·0	12·6	4·4
9	130	17·0	12·7	4·3
10	130	19·0	13·2	5·8
11	120	19·0	13·3	5·7
12	110	19·0	13·3	5·7
13	100	19·0	13·7	5·3

The summary of these thirteen tests of gas passing once through oil was:

Highest illuminating power of gas before scrubbing	21·30 candles.
Lowest ditto	17 00 ,,
Highest illuminating power of gas after scrubbing	17·40 ,,
Lowest ditto	12·60 ,,
Greatest loss	5·80 ,,
Average loss	4·29 ,,

From these results it would seem that even slight contact of illuminating gas with oil causes a loss in illuminating power, and that the amount of loss is not directly proportional to the temperature of the oil used, provided it is below the flash-point.

After these experiments, it occurred to the writer that partial scrubbing of gas with oil might be resorted to for the purpose of removing naphthalene; but it seemed certain that thorough scrubbing, with long, intimate contact between the oil and gas, would destroy the candle power.

A small experimental scrubber was made and was filled with wooden trays nicely fitted, so that neither gas nor oil could bye-pass the trays. This vessel was constructed for the purpose of slowly scrubbing small quantities of gas in contact with an excessive amount of oil at temperatures ranging from 70° to 160° Fahr. After having been convinced that oil is capable of removing certain hydrocarbons from gas, it was decided to adopt oil as one of the reagents for absorbing these illuminants during the experiments; and a Hempel pipette was filled with some crude petroleum of 16·5° Baumé, and used in analyzing the gas immediately following the absorption of carbonic acid gas, and preceding the fuming sulphuric acid pipette, for illuminants. The hydrocarbons thus absorbed by oil are indicated in the following analyses as "Illuminants No. 1," while "Illuminants No. 2" are those absorbed by fuming sulphuric acid after the oil pipette had been used.

EXPERIMENT A.—*Oil Gas 17·9-Candle Power (large Sample in holder).*

	Per Cent.
Carbonic acid gas	2·5
Illuminants No. 1	1·5
Illuminants No. 2	4·8
Total illuminants	6·3

The 17·9-candle gas was passed through the oil scrubber, and again tested for illuminating power, and for illuminants No. 1 with oil and No. 2 with fuming sulphuric acid. The following were the results:

Temperature of Oil. Deg. Fahr.	Illuminating Power. Candles.	Illuminants No. 1. Per Cent.	Illuminants No. 2. Per Cent.	Total Illuminants. Per Cent.
70	4·1	*nil*	4·5	4·5
80	3·1	,,	4·0	4·0
90	3·8	,,	4·4	4·4
100	2·4	,,	4·9	4·9
110	4·3	,,	4·5	4·5
120	2·6	,,	3·8	3·8
130	3·5	,,	4·7	4·7
140	4·0	,,	4·2	4·2
150	6·3	,,	4·7	4·7
160	5·1	,,	4·9	4·9

The maximum effect on the gas was with oil at 100° Fahr., when one passing through the scrubber lowered the illuminating power from 17·9 to 2·4 candles, and the hydrocarbons were reduced from 6·3 to 4·9 per cent.—in other words, reducing the hydrocarbons 1·4 per cent. by oil scrubbing lowered the illuminating power 15·5 candles.

EXPERIMENT B.—*Oil Gas and Lamp Black Water Gas, 19·8-Candle Power.*

	Per Cent.
Carbonic acid gas	3·0
Illuminants No. 1	1·5
Illuminants No. 2	6·9
Total illuminants	8·4

This test was in every way similar to Experiment A, excepting

that the gas used had higher initial candle power and illuminants. The gas was scrubbed with crude oil of 16·5° Baumé.

Temperature of Oil. Deg. Fahr.	Illuminating Power. Candles.	Illuminants No. 1. Per Cent.	Illuminants No. 2. Per Cent.	Total Illuminants. Per Cent.
70	2·9	*nil*	6·0	6·0
80	2·6	,,	6·0	6·0
90	2·9	,,	6·2	6·2
100	2·3	,,	6·2	6·2
110	2·5	,,	6·4	6·4
120	2·8	,,	6·4	6·4
130	3·2	,,	6·6	6·6
140	3·8	,,	6·4	6·4
150	4·1	,,	6·0	6·0
160	4·0	,,	6·4	6·4

In this experiment, the maximum effect was also with oil of 100° Fahr., when the oil scrubbing reduced the illuminants from 8·4 to 6·2 per cent., and the illuminating power from 19·8 to 2·3 candles; thus showing that 17·5 candles of illuminating value was produced by 2·2 per cent. of the volume of the gas, or by 26 per cent. of the illuminants contained in the original sample.

Experiment C.—Oil Gas, 19·9-candle power.

	Per Cent.	
Carbonic acid gas		2·2
Illuminants No. 1	2·8	
Illuminants No. 2	4·2	
Total illuminants		7·0

In this experiment, the gas was scrubbed with a distillate of 24° Baumé.

Temperature of Oil. Deg. Fahr.	Illuminating Power. Candles.	Illuminants No. 1. Per Cent.	Illuminants No. 2. Per Cent.	Total Illuminants. Per Cent.
70	3·6	0·0	5·2	5·2
80	2·9	1·3	3·7	5·0
90	2·3	1·0	3·8	4·8
100	2·1	0·0	5·0	5·0
110	2·1	0·4	4·2	4·6
120	3·4	1·2	4·3	5·5
130	3·4	1·2	4·3	5·5

The greatest reduction in candle power in this experiment was with oil at 100° and 110° Fahr., when it was lowered from 19·9 to 2·1 candles; while at 100° Fahr. the illuminants were reduced from 7 to 5 per cent., or a loss of 17·8 candles by a reduction of 2 per cent. of illuminants. These experiments demonstrate the instability of part of the hydrocarbons, and the large proportion of the total candle power produced by a small amount of illuminants.

The illuminants removable by oil contain the cause of all naphthalene deposits, and the bulk of condensation other than water in street-main drips. They are the seat of fluctuations in candle power, and are affected by changes in gas humidity or water vapour content in the gas. They are also easily removable by compression. A glance at the tables of candle power would impress upon an observer that the scrubbing by oil had rendered the gas useless and unsaleable; yet the calorific value remains practically undisturbed. The loss in candle power is not accompanied by any proportionate, or even significant, loss in British thermal units. During the progress of the experiments, it was noticed that, after repeated use of the same oil for scrubbing, the oil became spent, or saturated by repeated exposure to hydrocarbons, and it was necessary to use fresh oil for each test. To determine the capacity of a given oil to absorb hydrocarbons, the following experiment was made. A small oil scrubber was constructed, and a special sensitive balance was used for weighing the apparatus and its contained oil and the increment due to the absorbed hydrocarbons. The apparatus weighed 1740·2 grammes, and the oil 118 grammes (4·165 oz.); the total weight of apparatus and oil being 1858·2 grammes. The oil used was California crude petroleum of 14·8° Baumé at 60° Fahr., ·9682 sp. gr., and weighing 8·055 lbs. per gallon. Oil gas of 20·3-candle power was passed through the scrubber for two hours at the rate of 5 cubic feet an hour, and then at 10 cubic feet for a period of 1 hr. 30 min.

The candle power was taken by bunsen bar photometer tests, and the lessened decrease shows the progress of the saturation of the oil by hydrocarbons, and finally its failure to absorb any more of the illuminants. The oil gas used was of 20·3-candle power.

Time.	Quantity of Gas Passed through Scrubber.	Illuminating Power after Scrubbing.	Lessened Decrease in Illuminating Power.
12.00 noon	Start	7·2 candles	—
1.00 p.m.	5 cubic feet	16·5 ,,	9·3 candles
2.00 ,,	10 ,,	18·7 ,,	2·2 ,,
2.30 ,,	15 ,,	20·0 ,,	1·3 ,,
3.00 ,,	20 ,,	20·6 ,,	0·6 ,,
3.30 ,,	25 ,,	20·7 ,,	0·1 ,,

After scrubbing, the apparatus and oil weighed 1861 grammes —a gain of 2·8 grammes, or equal to 2·37 per cent. in weight of hydrocarbons absorbed from 25 cubic feet of gas. The oil after having been used for scrubbing was 16·5° Baumé—an increase of 1·7°.

Analyses of two samples of gas taken simultaneously showed that oil removes nothing but hydrocarbons of the illuminant content of the gas.

It is possible that a uniform system of gas making, using oil of even quality, through ranges of temperatures comparatively constant, may produce gas of which the candle power and heat units appear to bear a fixed relationship to each other. This relationship is misleading, however, as heat units and candle power are not entirely dependent one upon the other, any more than is the percentage of illuminants contained in the gas a safe measure of candle power.

This is well illustrated by the following experiments: Oil gas of 19·6-candle power and containing 7·7 per cent. of heavy hydrocarbons was analyzed to determine its constituents. The benzene was removed with nickel ammonium cyanide, and the other heavy hydrocarbons with fuming sulphuric acid; another sample of the same gas was analyzed, using the oil pipette and then the fuming sulphuric acid; and finally another sample of the same gas was passed through the oil scrubber and then analyzed.

	Original Gas.	Gas after Oil Scrubbing.
Candle power	19·6 candles	4·9 candles
B.Th.U. (by the Junkers calorimeter)	657	627
B.Th.U. (by analysis)	715	689
Specific gravity	0·493	0·489

Analysis.

	Original Gas. Per Cent.	Original Gas, Using Oil Pipette. Per Cent.	Gas after Scrubbing with Oil. Per Cent.
CO_2	2·6	2·6	2·6
C_6H_6	1·0	0·0	0·0
C_nH_{2n} (oil pipette)	—	1·7	0·0
C_nH_{2n} (fuming sulphuric acid)	6·7	6·1	6·0
O_2	0·3	0·2	0·4
CO	10·0	10·2	10·3
H_2	37·5	—	37·7
CH_4	37·1	—	37·7
N_2	4·8	—	5·3
	100·0		100·0

The reduction in candle power due to passing the gas through the oil scrubber was 14·7 candles, or 75 per cent. The reduction in heating value by the calorimeter was 30 B.Th.U., or 4·6 per cent., and by analysis 26 B.Th.U., or 3·6 per cent. The experiment shows that 75 per cent. of the candle power of the gas was produced by 1·7 per cent. of illuminants, and that this great reduction only affected the heating value 4·6 per cent.

In some experiments in making coal gas in 1901, gas made from bituminous coal was passed through a second chamber containing highly-heated coke, with the result that the hydrocarbons in the gas were entirely broken down, and the finished gas was non-luminous; yet it had the characteristics of coal gas, excepting hydrocarbons, and contained about 700 B.Th.U. per cubic foot. Some of the unstable hydrocarbons in illuminating gas are theoretically very high in heat units per cubic foot, as, for instance:

Naphthalene ($C_{10}H_8$)	6176	Ethane (C_2H_6)	1858
Benzene (C_6H_6)	4010	Ethylene (C_2H_4)	1673
Propylene (C_3H_6)	2509	Acetylene (C_2H_2)	1555

The complete combustion of these illuminants should develop the theoretical high candle power and heating effect. But it is impossible, under ordinary conditions, to provide a perfect admixture of air to a burner; and the result is a smoky flame, or loss of heat.

The adoption of a heat unit standard will not permit the gas manufacturer to make an inferior gas, nor to vitiate the gas with inert or impure gases. It will simply enable him to make a more stable gas which will withstand the shocks of changes of temperature and humidity, and the effect of friction in pipes and fittings. To fulfil the requirements of a standard of 500 B.Th.U. per cubic foot, the gas would have to contain a large percentage of marsh gas or other stable hydrocarbons. Hydrogen alone would not meet this requirement; for although it is an exceedingly hot gas when considered by weight, it is also a very light gas, and contains but 344 B.Th.U. per cubic foot. Carbonic oxide has a value of 343 B.Th.U. per cubic foot, and, either alone or mixed with hydrogen, would not meet the above requirements. Where water gas is now employed as an enricher of coal gas, in the event of the adoption of a heat unit standard, the water gas may be used as a diluent heating gas, consisting mainly of hydrogen, marsh gas, carbonic oxide, and a small amount of stable illuminants. This gas would help to dilute, sustain, and consume the illuminants of coal gas.

In changing from the candle-power to the heat-unit standard, all the errors which enter into photometry are eliminated; and not the least of these is the personal error of the observer, sometimes amounting to as much as 10 per cent. For after all the refinements of photometric testing have been practised, the final determination of the candle power must rest on the visual impression of light upon the human retina; and there are no instruments for measuring the fallibility of human judgment.

Gas of 500 B.Th.U. per cubic foot would be a satisfactory gas for the use of the consumer. It may be non-luminous; but it would probably be a gas of low candle power, and it would not in any sense be a poor gas, nor could it be carelessly made. Such gas would stimulate new uses for gas, and these new uses would increase the production; thus resulting in economies in manufacture, redounding to the benefit of the manufacturer as well as the consumer.

In the course of an address on mill planning, delivered before the Oldham Technical Association, Mr. J. W. Kershaw predicted that in future mill building they would see, among other things, the grouping of mills together, and electricity obtained from a central plant; further economy in lighting by high-pressure gas and electricity; the installation of heating and humidifying plants controlled absolutely automatically and self-recording.

MIDLAND JUNIOR GAS ASSOCIATION.

Visit to the Works of Messrs. John Wright and Co.

On Saturday morning, a big party of members of the Association assembled in Thimble Mill Lane, Birmingham, for the purpose of inspecting the works of Messrs. John Wright and Co. This arrangement enabled the visitors to spend two or three hours in the different shops while work was in full swing; and though, of course, the time at disposal was quite inadequate to allow them to see everything there was to be seen, the members were able to form some idea of the magnitude of the operations carried on by the firm. On arrival, they were met by Mr. H. James Yates, the Managing-Director, who—with the Chief Chemist (Mr. Forshaw), the Works Manager (Mr. Davy), and several other members of the staff—showed them round and gave full explanations of the various processes.

It is impossible here to describe all that the members saw in their tour of the works, which cover over 20 acres. There are the large recently completed stores, which give the firm accommodation for storing and packing goods which is represented by a floor space three-quarters of a mile in length. Works for furnaces of all descriptions have also been started; and the visitors were shown under construction a large crucible tilting furnace, which is a piece of engineering work not always seen being made in a gas-stove factory. The firm have, it was learnt, decided to make very big extensions of the foundry; for though the present shop is a 5-acre one, it is not nearly large enough. The position Mr. Yates takes up is that all goods have to reach a certain standard in the test-rooms; and when they attain it this standard is advertised, and the firm are prepared, if their statements are disputed, to allow any independent authority to come in and conduct his own tests. Every possible precaution is taken in the works to ensure efficiency. There are inspectors about the place whose duty it is to go and examine goods, whether in the packing room, the stores, or the machine shop. Sometimes even when goods have been packed for shipment they will have a crate opened and examine the contents. If then anything is found to be wrong, the foreman is called up, and if he disagrees with the decision, the attention of the Works Manager is called to the matter. The works, large as they are, are as busy as they can be; and they have a night shift.

When the castings leave the inspection room after the foundry, everything that has to stand pressure is subjected to a hydraulic test. Even in the case of the little "Garajo" boiler, small as it is, every one of the pipes is tested, to prevent possibility of leakage. With castings that have to go through the machine-shop, all the work that is done on them there—drilling, or facing, or whatever it may be—is carried out on jigs; and the firm guarantee that when the castings leave this department everything is interchangeable. Take gas-fires, for instance. There are a large number of different patterns and many sizes of each pattern; and the firm guarantee that the parts of the same size fire, whatever the pattern may be, are absolutely interchangeable. The only difference is in the fire-fronts. The same applies to practically everything they make.

Some time was spent in the laboratories, where the method of testing fires that is employed there was fully explained by Mr. Forshaw.

At the conclusion of the inspection, the visitors were the guests of the Directors at a stand-up luncheon; and after this Mr. Yates fulfilled a promise he had made to informally address the members on the subject of

Manufacture and Uses of Gas Consuming Apparatus.

Mr. Yates, in opening his remarks, said when the President was good enough to ask if he would give them a lecture, it seemed to him it would be better if he had something more in the nature of an informal chat with the members. Though they had spent a good time on the works that morning, it was, of course, quite impossible on a visit of this kind to adequately illustrate to them the manner in which the firm carried on their work there.

Gas-stoves years ago were really very crude things. The idea of interchangeability did not exist; and machine-shops in connection with gas-stove castings were not dreamed of. Fitters simply took the castings as they were, and fitted them together with emery wheels and files, and so turned out what was considered a gas-stove. Now all this was changed. For a good many years he personally had had only one idea in his head, and that was that everything made in the works should be absolutely interchangeable; and, further, his firm did not let any goods leave the works until they had reached a certain standard of efficiency. Should anyone receive anything from them and state that it did not reach this efficiency, the firm were willing for any independent authority to come into the works, and either bring his own instruments or use those of the firm, and make his own tests; and they would guarantee that, if these tests were fairly carried out, what the firm claimed would be found to be realized. They bought specimens of everything that everybody else made, and subjected them in the works to the tests which they applied to their own goods; and, of course, his firm found that they did not know everything. They were quite willing to learn from anybody. They were not perfect; but they did find that their own goods came up to the standard they advertised, and they did not always find this to be so in other cases.

The visitors had that day had a chance of glancing at the laboratories on the works; and, in connection with these, he would just say that, if a manufacturer was determined to keep up his standard of efficiency, one thing he must be quite certain of was that the raw materials he used were of the necessary quality to enable him to produce that standard. His firm made daily analyses of all the materials they employed. When the iron was running from the furnaces, they cast what they called test-plates; and the date and hour at which it was cast was shown on the plate. Then drillings were made from these plates, and sent into the laboratory and analyzed. When working with castings that had to stand pressure, he thought many of them would be surprised if they knew what a small variation in the percentages would affect the strength of the casting. They even analyzed the bye-products of their furnaces, to make sure they were not throwing away anything that ought to be kept.

When there was any idea of altering or improving any existing apparatus, or of turning out an entirely new thing, of course the matter was talked over among the heads of the various departments through which the apparatus would have to go. Different views would be expressed; and after a good deal of consultation, the idea was put into shape on paper. But when the drawing office had done with it, there was still a long way to go before the pattern shop was reached. It might be seen that difficulties would arise in manufacturing the apparatus as it was represented on paper. When all these points were solved, a rough model was made, and the first piece of apparatus was produced and sent to the test-rooms. This was where theory was converted into practice; and much time might be occupied in the process. For instance, they had been engaged for some three years on a certain class of hot-water apparatus. Every month they had got nearer to the goal, until at last some apparatus which they would see on the market next year had been developed. But no matter what it was, it had to go through the same process. As soon as those responsible in the test-rooms had proved that the apparatus was what the firm required, and up to the efficiency they were aiming at, the patterns were completed. Then the first finished article went back to the test-room, to make sure that nothing had gone wrong during the making of the patterns. If all was in order, they went ahead; but if it was found that anything had gone wrong, they saw that it was put right. This, briefly, was the method on which they worked there.

For a long time they had been working on the right lines; and the gas-fire of to-day as made by everyone was practically a reproduction of the gas-fire of these works. It was rather a lot to say; but he said it without fear. There was evidence in the patent office that they were the originators and pioneers of the gas-fires as now made. In their fires they did account for every heat unit. They had an efficiency which they would guarantee, and which reached as high as 55 per cent. One saw claims of 65 per cent.; but he held that this could not, in fact, be obtained. As they all knew, not so very many years ago, most of the heat obtained from gas-fires was high temperature convection. People went into a room, and said: "I can taste the gas-fire; it is a stuffy sort of atmosphere." This was so. The bulk of the fires poured a large part of their products into the room. Everything was done to induce the air of the room to flow inside the fire. It was simply charred; and the result was that the atmosphere was unpleasant. Radiant heat had a faculty of passing through the air without appreciably warming it. The sun did not heat the atmosphere; it heated the earth. It was the same with the gas-fire. What they wanted was radiant heat. They would always get a certain amount of convected heat; but it should be kept low, and the temperature should be kept low. Then they would obtain the effect of a small percentage of 20 to 25 per cent. of low temperature convected heat warming the air, while the radiant heat was warming the contents of the room, which, in turn, warmed the air, giving the same result as coal-fires.

With regard to the construction of gas-fires, it was hardly necessary for him to point out that pressures varied considerably in different towns, and, in fact, in the same town. Even small gradients would affect the pressure. Then there was the varying calorific value of gas. These things were against the gas apparatus manufacturer. Of course, the ideal conditions were a higher pressure (in many cases the pressure was too low), a constant pressure, and a constant calorific value. Then they could supply apparatus to work differently from that of to-day. What they now had to do was to make their burners adjust themselves to the varying conditions; and this they had succeeded in doing. The burners that his firm sent out in their gas-fires to-day would adjust themselves to the varying pressures. This had largely to do with the design of the burner, and also to do with the injector. Many injectors were so made that they reduced the consumption of gas by throttling it; but this was a mistake. Gas must not be throttled when it was wanted to burn with high aëration, because the proper mixture could not be obtained. The only force was the gas; and this was very small. Yet some manufacturers went out of their way to throttle it. Whenever they restricted the supply of gas to a bunsen burner, they should cut certain definite portions off, and let there be absolutely a clear flow right through the injector. They should have a "live" gas all the time. This was one of the most essential features in getting burners to work consistently with the varying pressures and calorific values that were at present experienced.

In the case of burners with cast holes, there might be some slight variation from different causes; and with the type of fuel—

or "radiants," as they called them—now used, unless the flame was absolutely central, combustion would be upset. This was why he contended that all the holes of the burners should be drilled on jigs. He had recently seen statements as to the Venturi tube being used for gas-fire burners; but the Venturi tube, of course, was very old. He had been in the gas-stove business many years now; and it was difficult to say when use was first made of the Venturi tube. No burner ought to be put in a gas-fire unless it would burn the right amount of gas for the particular fire under any conditions which the fire had to face; and this was what he guaranteed could be done with his firm's fires. If a burner was made to burn 20 cubic feet an hour, and the user tried to force 40 cubic feet through it, the manufacturer must not be blamed if the result proved unsatisfactory.

With regard to hot-water supply, this was a matter to which the Company had for many years past been giving a very large amount of attention; and they had spent many thousands of pounds, without as yet seeing any of it back. But they knew it was money well spent. There were a good many people making hot-water appliances who made wonderful statements and wonderful changes every day in the construction of their apparatus; and they were still a long way off the ideal. His firm had, however, stuck to the one thing. They had another coming along; but the present form was the best they had been able to do until now. Hot-water apparatus, if it was ever going to become universal, must be far more economical; and it must, further, have some absolute means of controlling the supply of gas. The small circulator had its points; but even this type of apparatus possessed drawbacks in its construction which, from a maintenance aspect, were very serious to a gas authority. It must be possible to clean any hot-water apparatus installed in a house, and do all that might be necessary to it, without breaking any connections and *in situ*. This was not the case with the apparatus of to-day. With the circulator system, they had to ensure that the servants lit the gas at the right time and turned it off when not wanted; for it was rather wasteful to leave it burning all night. He pinned his faith to the self-contained apparatus. He did not say it was one which would meet every conceivable case, for it would not; but it met the requirements of the majority of householders. Anyone getting up early in the morning and going to the bathroom, did not want to find there was no hot water. People wanted hot water whenever they went to the bath; and with a circulator they did not get it. To have the store of water immediately over the burner was more economical, because there was no circulating system between the boiler and the storage. Whenever water was drawn from the apparatus, the gas would go immediately on full; and as soon as the water was heated up, the thermostat would come into action. They claimed that their "Sun" boiler could be cut down to about 3 cubic feet per hour, and keep 20 gallons of water at 150° Fahr. One consumer had even told them it could be done with 2·2 cubic feet of gas. This showed that the apparatus could be used in quite a small house without any undue cost. The circulator had a big future before it; but it would never take the place of this.

Referring to the liability of different types of thermostats to vary before they had been very long in use, he said the thermostat employed with the "Sun" boiler consisted essentially of two pieces of metal, one pulling against the other. This particular type of thermostat had been in service for ten years, and had never varied in its action since the day it was set.

Turning next to the question of the Home Office and the use of flueless heating apparatus, he remarked that section 6 of the Workshop Act implied that an apartment should be heated without interfering with the purity of the atmosphere. If this were taken literally, one could never heat any place coming under the eye of the Home Office where the products of combustion entered the room. This was a serious thing so far as his firm were concerned, and threatened the destruction of a very large industry. So they began to look round, and try to find out the commonsense of the matter. They found the authorities allowed 12 parts of carbonic acid per 10,000 in workshops as quite a minimum standard; and with gas-light they permitted 20 parts, and in some cases 23 parts. What, therefore, they proceeded to do was to send their men all over the country to take samples of air in all the different sorts of places that came under the factory inspectors. The samples were taken at the end of the day, before the workpeople left—one day with the radiators going, and another day without them. The samples were sent to the works and analyzed; and it was found the radiators did not add 5 parts of carbonic acid per 10,000. If, therefore, the ordinary atmosphere contained from 3 to 5 parts, and they took the maximum and added 5 parts, they were under the 12 parts per 10,000. Thus they realized that the Home Office had not a leg to stand on, providing the places were suitable for heating by these means. They had a very elaborate form to be filled up; and from this they could see whether the place was suitable for flueless stoves. If they found then that the ventilation was not as it should be, or there was something about the trade carried on which affected the matter, they told the gas officials or the customers that the necessary alterations must be made, and that if this were done his firm would stand by them and see the thing through.

At the conclusion of the address, some questions were put to Mr. Yates, who, in reply, said the reason they did not use a bunsen burner in the "Sun" boiler was that when a bunsen was cut down below a certain point of consumption it would light-back. A luminous flame could be gradually brought down until it went right out. With a bunsen burner they could get contact, and with a luminous flame they could not. But by utilizing all the heat units they obtained as good a result with the luminous flame as with the bunsen burner. Of course, some types of apparatus had bunsen burners; but these were for use under specified conditions, and not where it was desired to cut the consumption down to the lowest limit, so as to have the burners going day and night. As to radiators, the firm's annual sales ran into five figures.

A Vote of Thanks.

The President (Mr. R. J. Rogers, of Birmingham) proposed a very hearty vote of thanks to Messrs. John Wright and Co. and to Mr. Yates and his co-Directors for the opportunity afforded the members of visiting their magnificent works, and for the hospitality extended to them. He also associated with the vote the names of Mr. Davy and Mr. Keeley, who had been assiduous in imparting knowledge to the visitors. He said he had been surprised at the magnitude of everything, and had been struck with the great care that was exercised in every department. As to Mr. Yates's remarks, he would like to say how much he appreciated what had been said on the subject of the interchangeability of parts, whether in connection with gas-fires or any other apparatus. They all knew the tremendous quantity of gas apparatus that was now being fixed on hire; and interchangeability was a point that would come prominently to the front. Though they did not anticipate there would be very extensive renewals needed, because of the high state of efficiency attained by the apparatus, still there must in the future necessarily be parts requiring renewing; and that would be the time when the undertakings who did not take account of the matter now would have it forcibly brought home to them. With regard to the thermostat on the "Sun" boiler, he believed Mr. Yates said it had been in use upwards of ten years. He (Mr. Rogers) could improve upon this. He believed it was a similar arrangement—though it was not at that time called a thermostat, but the Summerskill valve—that had been in use in the Birmingham Council House for nearer twenty years than ten; and it had worked most efficiently during the whole time. In fact, he thought on only one occasion had it required to be taken out to have some adjustment made. He had himself given some attention to the Home Office regulations, when coming in contact with factory owners who wanted to use gas-steam radiators. He saw the great difficulties that sellers of gas had to contend with in this connection, and could quote many cases showing the absurdity of the Home Office officials in maintaining, or endeavouring to maintain, their attitude with reference to the percentage of so-called injurious gases in a room. A great deal could be done by suggesting to the factory owner the more efficient ventilation of his workshop—not only when gas-steam radiators were proposed to be used, but also with other apparatus.

The Vice-President (Mr. F. Shewring, of Droitwich) seconded the proposal, and said they all greatly appreciated Mr. Yates's "little chat." The plain and simple language he had employed, added to the value of his remarks to the members. He might say that he had just installed one of the latest gas-fires made; and he had purposely altered and varied the calorific power of the gas to see what effect it would have on the fire. When one got past a certain limit, it was astonishing what an action it had. He found if the fire was correctly adjusted for a fixed calorific power, roaring was conspicuous by its absence; and it was only when there was variation in the power that they had noise. Mr. Yates and the President had referred to the difficulty that was met with at times in selling apparatus, consequent on the rules of the Home Office. He himself had had occasion to go some time back into the question of heating a school. There happened to be flues at both ends, and so they suggested the use of gas-fires, and offered to take them out again if they did not prove satisfactory. The architect, however, replied that it was a new departure to heat schools by means of gas-fires; and for the time being, at any rate, he could not sanction it. A point had been raised as to corrosion of radiator valves. He might mention that he had about a dozen steam radiators fixed in the brine baths at Droitwich; and he did not think they could be under worse conditions from a corrosion point of view. But they had been fixed some two years; and so far there had been no trouble at all with the thermostat valve.

Mr. W. H. Johns (Saltley) briefly supported the vote; and it was carried with acclamation.

Mr. Yates, in acknowledging the compliment, remarked that he hoped the time would not be far distant when he would have them there again, and that they would then see big extensions of the works. In fact, if they were not going to turn their friends into their enemies, they must do something to increase their output.

Forthcoming Visit to London.

For Saturday week (the 18th inst.), members are reminded, arrangements have been made for a visit to London. The train is timed to arrive at Euston at 2.45 p.m.; and the visitors will there be met by a Sub-Committee of the Council of the London and Southern District Junior Gas Association who (with Mr. W. J. Liberty) have drawn up a programme for the day. The first move will be to Farringdon Street, where, accompanied by the full Council of the London Association, an inspection will (by permission of the Corporation) be made of the system of main and service laying in the underground street of the City of London, under the guidance of Mr. Liberty. At 5 o'clock the

party will assemble at De Keyser's Royal Hotel, Blackfriars, for a tea and reception, at which it is anticipated that several of the chief officials connected with the London gas industry will be present. Subsequently the members will proceed by motors (accompanied by a City lighting official) to view the experimental gas and electric lighting in the principal thoroughfares of the City—more especially the centrally-hung lamps, with raising and lowering gear. Demonstrations of this raising and lowering will be given by the Companies concerned. At Temple Bar, the party will enter the area of the City of Westminster, and, under the guidance of the Chairman of the Lighting Committee (Mr. Jacques Abady), will inspect the high and low pressure lighting recently installed by the Gaslight and Coke Company. Reaching Horseferry Road at 8 o'clock, the visitors will be received by the Gaslight and Coke Company and shown their compressor station. Through the courtesy of Mr. D. Milne Watson (the General Manager), refreshments will be served, and opportunity will be given by Mr. F. W. Goodenough (the Controller of the Sales Department) to inspect the latest type of centrally-hung high-pressure lamp service in position—with a demonstration. At about 8.45 the lengthy programme will have reached its end; and the members will then be free to make their own arrangements. The return train for Birmingham will leave Euston at 12.45 a.m.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Linacre Works of the Liverpool Gas Company.

About 70 members of the Manchester and District Junior Gas Association availed themselves of the opportunity afforded on Saturday afternoon of an inspection of the Linacre works of the Liverpool United Gas Company, where there are to be seen different systems of carbonization in operation with up-to-date charging and discharging machinery, not forgetting the cyanide plant, which was of special interest to many of the visitors. The works cover some 23 acres, employ about 600 men, and the make is 12 million cubic feet of gas per day. On arrival at the works, the party were welcomed by Mr. Edward Allen, M.Inst.C.E., the Chief Engineer, Mr. R. E. Gibson, Assoc.M.Inst.C.E., the Assistant-Engineer, and Mr. E. Astbury, the Superintendent. Those present included Mr. A. L. Holton, President of the Manchester Junior Gas Association, Mr. D. V. Hollingworth, F.C.S., the Junior Vice-President, Mr. J. Alsop, the Hon. Secretary, Mr. J. Robinson, the Hon. Treasurer, and several members of the Council. Having been split up into sections, the party at once proceeded to the business of the day—Mr. Allen and members of his staff acting as guides and explaining the working of the different plant in use at these extensive works.

At the conclusion of the inspection, the visitors, on the invitation of the Directors and Engineer of the Company, had tea together in the administrative block of buildings. Following this, a business meeting was held under the presidency of Mr. A. L. Holton.

Mr. J. Robinson (Altrincham), at the call of the Chairman, proposed a vote of thanks to the Directors of the Liverpool United Gas Company and Mr. Edward Allen, the Engineer, for having afforded the members an opportunity of inspecting the Linacre works, and also to the staff for their services in showing the party round the works. The visit had been a most interesting one, and he was sure all who had taken part in it felt deeply indebted for the hospitality that had been extended to them. It was another evidence of the interest Mr. Allen took in their Association and the encouragement he gave to any project they might have in hand.

Mr. E. Kenyon (Middleton) having seconded the resolution,

The President, in supporting, recalled the fact that, some five years ago, they showed their appreciation of the help Mr. Allen was always ready to give them by electing him a life member of the Association. Since then, Mr. Allen had been among them two or three times; and that day they had had further evidence of the interest he took in their Association. He thought he was justified in saying that the proceedings that day had further cemented the friendship between Mr. Allen and the Association. Their visit to the Linacre works had been not only an interesting one, but instructive, because of the various systems of carbonization, and charging of retorts, to be seen in operation there; while the cyanide plant had been a special attraction to many of them. In other ways, the works of the Liverpool Gas Company were a source of education to them, which, no doubt, accounted for the large attendance they had that day.

The resolution having been carried with hearty applause,

Mr. Allen, in his response, disclaimed any special virtue or merit for himself in connection with the visit—all the credit being due to Mr. Gibson and Mr. Astbury, not forgetting Mr. Carter—a very valuable member of his staff, and, he believed, a member of the Council of the Junior Association. He (Mr. Allen) had always taken the very liveliest interest in the Association; and he could assure them he much appreciated the honour they paid him in making him a life member. As he was a member of the Association, they had a claim on his services—a claim he should always be glad to recognize. As to what they had seen that day, he could say they had not yet finished in regard to variety of systems. They did not know what was in the future for gas manufacture, if it was to play its part; but of this he was quite sure, they could not afford to stand still—to stand as they did to-day. It was a fact that in Liverpool they were somewhat handicapped in the matter of progress, because of the high quality of gas they were bound to supply. There was no doubt greater progress could have been made had they been left unfettered and allowed to do that which was most suited to the people's needs. All gas undertakings were a trust, and should have but one aim, and one object, which was to do the best possible for the consumer.

Mr. R. E. Gibson also responded. He said that if he had helped at all to make the visit a success, he was amply repaid. He hoped they had been able to pick up some new ideas as the result of their inspection of the works.

Alteration of Rules.

The alteration of one of the rules of the Association was next considered. It was explained by the President that a month ago notices were sent out by the Council recommending the substitution of the word "may" for "shall" in Rule 11, which would then read as follows:

> The Council may nominate a candidate for Junior Vice-President, the same to be specially notified on the ballot papers, &c.

On the motion of Mr. J. Taylor (Mossley), seconded by Mr. C. J. M'Donald (Bolton), the recommendation was approved.

Notes on Carbonization.

The President then called upon Mr. E. Astbury to read a paper entitled "Notes on Carbonization," which, together with the short discussion thereon, appears on p. 389.

New Experiment with Coke.

For the information of the company, and at the request of Mr. Allen, there was shown on the screen, by Mr. Gibson, details of a plant designed for the purpose of doing away with the flame, smoke, and dust arising from the coke when being dealt with after leaving the retorts—an additional advantage being the production of a better class of coke than obtained by the present system of plunging it into water. Experiments were now being carried out at the North works at Linacre, and Mr. Allen thought some few particulars might be of interest to the visitors. There were several disadvantages in the present system of dealing with the coke. In the first place, the flame, smoke, and steam given off in the retort-house caused excessive discomfort to the employees. Then the method of quenching by plunging the coke into water damaged it to a considerable extent—causing it to fly apart, the lumps to break, thus forming a considerable amount of breeze. Again, coke thus treated was reduced in calorific value as a fuel, because of the quantity of water it contained. In the experiments they were now carrying out, a box with two compartments was used, supported by trunnions from a transporter or telpher and running along overhead. The box, when lowered and filled with coke from the retorts, had a heavy door or lid dropped on to it, excluding the air and confining the smoke and flame. The box was then transported and dropped into a tank and cooled by water pumped constantly from the adjoining canal. The box was allowed to remain in the tank some time, and was then transported to a place where the coke was to be stacked, or a point for tipping into railway waggons or hoppers as required. By this treatment they did away with the flame, smoke, and dust, and the coke produced was hard, bright, and quite good and lumpy, with no breeze.

This concluded a very interesting half-day's experience.

The Evening Lectures at the Manchester University.

As already announced in the "Journal," special courses of evening lectures have been arranged by the Manchester and District Junior Gas Association for delivery at the Manchester University. The first course consists of six lectures on "Chemical Aspects of Carbonization," by Dr. Harold G. Colman, commencing on Thursday, Jan. 11, at seven o'clock, in the Chemistry Theatre. The second course will be on "Theoretical Problems Involved in Incandescent Lighting;" the lecturers being Dr. Walter Makower, M.A., Dr. H. Stansfield, Mr. E. J. Evans, Mr. H. J. G. Moseley, and Dr. J. N. Pring. These lectures will be delivered in the Physics Theatre on Thursdays, and commence on Feb. 22. The fee for the two courses of twelve lectures will be 10s. 6d. to members of Gas Associations, and £1 1s. to others. Since the previous announcement, a change has been made in the order and date of the commencement of the lectures, to meet the convenience of the lecturers, and to enable suitable experimental apparatus and demonstrations to be provided.

Society of Arts.—The 158th session of the Society will open to-morrow week, Nov. 15, with an address from Lord Sanderson, G.C.B., the Chairman of the Council. Five ordinary meetings are announced before Christmas; and four Cantor Lectures on "The Carbonization of Coal" will be delivered by Professor Vivian B. Lewes, F.I.C., F.C.S., commencing on the 27th inst. In the first lecture, Professor Lewes will describe the composition of coal; in the second, explain the methods employed in its destructive distillation; in the third, the thermal conditions existing during the combustion of coal will be dealt with; and in the concluding lecture, the possible improvements in carbonization will be considered.

INCREASED WATER STORAGE FOR LONDON.

Completion of a Large Reservoir at East Molesey.

Last Saturday, the large reservoir which has been constructed by the Metropolitan Water Board at East Molesey was formally opened by the Lord Mayor (the Right Hon. Sir T. Vezey Strong), in the presence of the Chairman (Mr. E. P. Barnard, J.P.), the Vice-Chairman (Mr. G. S. Elliott, J.P.), the members and chief officials of the Water Board, and a numerous company. The following particulars of the reservoir were furnished in an illustrated *souvenir* prepared for the occasion.

The new reservoir, which is situate in the urban district of East and West Molesey, has been constructed by the Board upon land acquired by the Lambeth Water Company, under powers conferred by their Act of 1900. The Company were authorized by the same Act to construct a reservoir upon the site; but the powers were not exercised. In 1907, however, the Board, by their Various Powers Act of that year, were authorized to construct the reservoir, subject to certain modifications in extent and design; and they immediately took steps to secure the completion of the work, in order to keep pace with the growing necessity for additional storage reservoirs. Competitive tenders having been invited for the work, the contract was let to Messrs. Robert M'Alpine and Sons, at the sum of £152,727. The actual construction of the reservoir was commenced on Oct. 24, 1908, when, in the presence of the President of the Local Government Board, the Right Hon. John Burns, M.P., the then Chairman of the Works and Stores Committee (Mr. Charles E. Hearson) performed the ceremony of cutting the first turf.

The reservoir will contain 900 million gallons when filled to the level of 59 feet above Ordnance datum; and the water area will be about 121 acres. The embankment is 1 mile 1200 yards in length, and contains 1¼ million tons of earth taken from the inside of the reservoir. The puddle trench is nearly 3000 yards in length, and had to be carried down to the London clay through a thick bed of gravel. In consequence of the proximity on every side of the Rivers Ember and Mole, considerable trouble was experienced by reason of the large volume of water flowing into the deep excavations during the construction of the puddle trench. In order to grapple with the difficulties encountered, and to take advantage of the best working months, Messrs. M'Alpine commenced work at a number of places, and for a considerable period employed as many as 1200 men.

The earth-works of the embankment, exclusive of the puddle wall, amount to about 950,000 cubic yards. For the construction of the works, something like 112,000 cubic yards of puddle clay, 3900 tons of cement, 2435 tons of cast-iron pipes, and 568 tons of steel pipes, besides other materials, have been required. The lining of the reservoir banks, from 10 ft. 6 in. to 4 feet below the top water-level, has been executed in ordinary concrete slabs; and above this level the embankment is lined with concrete blocks prepared by special machinery—about 90,000 blocks being used for the purpose. The principal part of the lining is curved; the top being finished with a concrete coping built *in situ*.

The water to fill the reservoir will be obtained from the Thames. A new main, 54 inches in diameter and about 1 mile 1200 yards in length, has been laid between the reservoir and the new pumping station at Walton, which was opened in June, as recorded in the "JOURNAL" at the time, and connections have also been made to the mains leading from the Board's reservoirs at Molesey, formerly belonging to the Lambeth and Chelsea Water-Works Companies. In addition, water can be gravitated from the "Knight" and "Bessborough" reservoirs at Walton; the top-water level of the new reservoir having been kept at a somewhat lower level for the purpose. After storage, the water will pass through existing mains, 54 and 36 inches diameter respectively, to the filter-beds at Surbiton.

The inlet works consist of a series of steps leading up to a large chamber (protected by a granite balustrading) into which are built five pipes—two communicating with the Walton works, and three with the other reservoirs above referred to. The water flowing from the pipes falls over a long granite weir, down the steps, and into the reservoir. Outlet towers contain the valves for regulating the passage of the water to the filter-beds.

The works, which have been completed well before the contract time, have been carried out under the direction and to the designs of Mr. W. B. Bryan, M.Inst.C.E., the Board's Chief Engineer.

The Opening Ceremony.

The ceremony of formally inaugurating the reservoir was witnessed by a large gathering, which included the Lord Mayors of Dublin and Cardiff, the Mayors of several of the Metropolitan Boroughs, Sir R. Melvill Beachcroft (the first Chairman of the Water Board), Mr. Edward White (the Chairman of the London County Council), and representatives of Metropolitan and Provincial municipalities. In declaring the reservoir open, the Lord Mayor—the Right Hon. Sir T. Vezey Strong—named it the "Island Barn" reservoir (it having been constructed on a site upon which a barn formerly stood); and expressed the hope that it might long conduce to the public good, to which it was dedicated. After the ceremony, his Lordship was presented, on behalf of the Contractors, with a memento of the occasion in the shape of a silver model of a ballast-waggon.

Luncheon was served in a marquee, under the presidency of the Chairman of the Board, who mentioned that he had received from the President of the Local Government Board (the Right Hon. John Burns) a letter in which he congratulated the Board and their Chairman on the success of their administration; the Board having met with ease, during the past remarkably dry summer, all the demands made upon them by the householders of Greater London. He thought this was forcible testimony to the value of the policy of municipal ownership and central control, and also to the benefit which had accrued to London from the linking-up of reservoirs which were formerly detached and isolated. The Lord Mayor, acknowledging the Chairman's welcome, expressed his pleasure at meeting his brethren engaged in the important task of self-government, because he had long felt that they represented a most important part of the government of the country, and a part which was not so generally recognized as it should be.

HIGH-PRESSURE DISTRIBUTION IN AMERICA.

In a recent number of "Engineering Record," some particulars were given by Mr. Chas. H. Hughes of the installation of a high-pressure gas-distributing system by the New York and Queens Gas Company, of Flushing (L.I.). It is interesting as showing how a low-pressure system can be cheaply and efficiently transformed into a high-pressure one.

The district served by the Company is a large and growing one, and the demands on the equipment reached such a point that it was necessary to lay more or larger mains, erect another district holder, or by some other means increase the pressure to supply the distant consumers. A large drop in pressure was shown by gauge readings. At the works there was a 5-inch water pressure; but at Bayside—a place seven miles distant—there was only 1½ inches. As the cost of compressors was small compared with that of a holder, it was decided to lay four miles of high-pressure mains, and deliver the gas at 3½ inches into the low-pressure line feeding Bayside, so that it would increase the pressure both ways.

A small compressor-house was built at the works, and two duplex steam-driven compressors were installed. The larger one has 12-inch steam and 16-inch gas cylinders, with a stroke of 12 inches, uses steam at about 100 lbs. pressure, and compresses the gas to 50 lbs.; while the smaller compressor has 8-inch steam and 14-inch gas cylinders, with an 8-inch stroke.

The compressors are connected so that either can be run independently of the other, or both at the same time. The small one is generally in service during the day when the load is comparatively light, and the larger one from 5 until 10 p.m.; or, should the load be exceptionally heavy, both can be used.

Gas enters the compressors at a pressure of 5 inches of water, and is discharged into the mains at 30 lbs. at the rate of 40,000 cubic feet per hour. Before entering the mains, it passes through controlling and check valves; the latter preventing it returning to the compressors.

The distributing system comprises four miles of high and 84 miles of low pressure mains. The former are of 4-inch wrought-iron pipe, having recessed screwed couplings with the threads covered with red lead and shellac before making-up. At every 400 feet an expansion coupling is inserted, and at every 1000 feet a gate-valve. At the end of the four miles, the 4-inch line is connected to a 20-inch line, which is part of the low-pressure system. Gas is introduced into the latter through two Reynolds regulators set in a manhole in the street. From the high-pressure mains consumers are fed through service-pipes, in each of which, before entering a house, is a regulator. In the low-pressure part of the system, no regulators are required; the usual cocks only being fitted. The author states that the compressor plant and the high-pressure system have given perfect satisfaction since their installation. The cost of compressing gas at the Company's works does not exceed 2c. per 1000 cubic feet.

The question is often asked in America as to whether the pressure at the burner falls, consequently giving less light, when the compressors stop forcing gas into the mains. Mr. Hughes says it does not; for, even if the pressure dropped several pounds, the regulators at the service pipes would automatically deal with the change, and supply the gas at a constant pressure to the consumer. Even when gas is used at 30 lbs., no change is made in the illuminating power—in fact, for lighting, heating, and operating engines, a higher pressure could be used than is at present commonly employed, and more satisfactory results could be obtained. Gasholders located in a residential portion of a city are unsightly. With the high-pressure system, they are not required; all that is needed being a small compressor-house.

Woodall-Duckham Vertical Retorts for Tottenham and Buda-Pesth.—Messrs. Duckham and Cloudsley, Limited, have obtained orders for installations of their vertical retorts at the above-named places. That for the Tottenham and Edmonton Gas Company will be of a capacity of 80 tons of coal per 24 hours, and it will be at work in about seven months. The installation at Buda-Pesth will deal with 24 tons of coal per day; and it will be erected at the Municipal gas-works in the immediate future.

WELSBACH

The Answer to the Lighting Question

The . .
WELSBACH
HIGH-POWER
SELF-INTENSIFYING
STORM PROOF
ARC LAMP.

UNEQUALLED
FOR
EXTERIOR
LIGHTING
ON
LOW PRESSURE
GAS.

Fig. 627.

SELF-CONTAINED.

NO
COMPRESSORS
AND
NO SPECIAL
MAINS
REQUIRED.

HIGHEST EFFICIENCY
EVER ATTAINED ON
LOW-PRESSURE GAS.

300, 600,
AND
1000 Candle Power.

Over 40 Candle Power
per
Cubic Foot of Gas.

With Midnight Flame
and
Outside Ignition.

WELSBACH

For Prices and Particulars apply to

THE WELSBACH LIGHT COMPANY, LTD.,
WELSBACH HOUSE, KING'S CROSS, LONDON, W.C.
Telegrams: "WELSBACH, LONDON." Telephone: NORTH 2410 (4 lines).
WELSBACH UPRIGHT MANTLES ARE C, CX, & PLAISSETTY.—INVERTED MANTLES A SPECIALITY.

PUBLIC LIGHTING.

SUGG'S
LAMPS
ALWAYS GIVE SATISFACTION.

Can be supplied either

SQUARE, CYLINDRICAL, OR HEXAGONAL,

AND OF ANY CANDLE POWER.

THE "WINDSOR."

THE "GROSVENOR."

OUR LAMPS CAN BE FITTED WITH WROUGHT CRADLE OR CAST BASE, BALL TRAP DOOR OR FLASHLIGHT, AUTOMATIC DISTANCE LIGHTER OR CONTOLLER, &c., &c.

Please send for Illustrated Price List with Full Particulars.

Telegrams: "SUGG, LONDON." *Telephones: 5153 (2 lines) WESTMINSTER.*

WILLIAM SUGG & Co., LIMITED, ENGINEERS, WESTMINSTER.

VERTICAL RETORT WORKING IN AMERICA.

As mentioned in the account of the proceedings at the recent annual meeting of the American Gas Institute which appears in another column, two of the papers submitted dealt with the working of vertical retorts. One was by Mr. WALTER G. AFRICA, who gave the results obtained with his installation at Manchester (N.H.); and the other by Mr. CARROLL MILLER, who furnished particulars of the vertical retorts at Providence (R.I.).

Mr. Africa stated that in the winter of 1907-8 he erected two benches of nine vertical retorts; but only one was equipped for operation, and the results were communicated to the Institute.* He then decided to try different sized retorts, in order to find what size and taper was best suited for his coals. To do this, he took out the retorts of the bench he had previously started, and put in five retorts of four different sizes and tapers, varying from 20 in. by 34 in. at the bottom to 16 in. by 22 in. He finally chose the latter as being the best suited for his setting, though all worked well. The two benches were then equipped with this size retort (18 in all), and the plant provided with a shelter over the retorts and the recuperator side of the bench. The rest was left exposed to the weather.

He started charging the retorts about June, 1910, and with the exception of a shut-down to change the closing devices, which were defective, the setting has been running since, and Mr. Africa says it has been most promising. At first he was troubled with the lower lids leaking badly; but by adding a clinching device he reduced this leakage to a point where it is of no consequence. Three retorts are charged and discharged at one time; being connected to one gas take-off.

In all his experiments with these retorts, he has had unusually high illuminating powers for vertical-retort systems; and he attributes this to the fact that a space of 4 feet of heated retort is left above the coal for the gas to pass through; thus fixing the vapours which in systems of full retorts do not reach the proper temperature for gasification.

In the early part of this year, a test was made in which all apparatus was carefully standardized and tested, and facilities were provided to get most accurate results. Candle powers and calorimeter readings were taken at frequent intervals through a mixing-tank. A pentane lamp was used for the photometrical standard, and a Junkers instrument for the calorific values. Both tar and ammoniacal liquor were collected in isolated tanks, and carefully measured and analyzed. The coke results were obtained by weighing the coke hot. The coal was ¾-inch screened from Farmington (W. Va.). The following is a summary of the test:

Yield per pound	5·59 cub. ft.
,, net ton	11,180 ,,
,, gross ton	12,522 ,,
Average illuminating power, flat-flame burner	13·47 candles.
,, ,, ,, Sugg "D" ,,	16·47 ,,
,, ,, ,, Met. No. 2 ,,	18·97 ,,
Candle-feet, flat-flame burner	75
,, Sugg "D" ,,	92
,, Met. No. 2 ,,	106
Calorific value per foot	600 B.Th.U.
,, ,, pound	3353 ,,

Residuals.

	Per Net Ton.	Per Cent. Coal.
Coke	1350 lbs.	67·50
Tar (dry)	14·40 galls.	6·73
Ammonia	6·17 lbs.	—

The furnace fuel was 13·27 per cent. of the coal carbonized, or 11·77 per cent. of the combustible charged into the furnace. If allowance is made for fuel in the ash thrown out, this figure would be lower.

These benches are, as stated above, exposed to the weather, and the thermometer went close to zero at night during the test.

The following figures are the total and average results for the five months' working from April to August. West Virginia coal from the Lincoln Mines was used, the shipping weights being taken, and allowance made for 2½ per cent. of moisture.

Corrected gas made, 1000 cubic feet	35,493
Coal carbonized, lbs.	6,338,288
Average weight per charge, lbs.	929
Yield per pound, cubic feet	5·69
Average illuminating power, flat flame, 70° Fahr.	14·08
Do., argand "D," Do.	17·08
Do., No. 2 "Metropolitan," Do.	19·58
Candle-feet per pound, flat flame	78·71
Do., argand "D"	95·48
Do. No. 2 "Metropolitan"	109·45
Coke used for furnaces, lbs.	895,800
Do. per ton of coal, lbs.	283
Do. per cent. of coal carbonized.	14·15

Mr. Africa pointed out that the furnace fuel did not show up so well as in the short test, due to various reasons; the principal one being that the coal used contained a good deal of slack, due to being broken up by frequent handling. This slack required more heat to burn off than clean lumps. He had no trouble from the coke not discharging freely, except when the charges were not burnt off. This, however, seldom occurred. Both primary and secondary air were measured by means of Venturi meters; and the average amount of carbonic acid in the waste gases was close upon 19 per cent.

Mr. Africa is adding two benches of nines to his plant, which will give him a total capacity of 500,000 cubic feet per day. A similar plant of five benches of nines is also being erected in Philadelphia, and will be in operation shortly. In their present form, he regards the Manchester verticals as a marked success.

* The installation was illustrated in the "JOURNAL" for Nov. 17, 1908 (p. 494), and its operation referred to in the number for Nov. 9, 1909 (p. 409).

Mr. Carroll Miller's paper was as follows:—

The retort installation at Providence is of the Dessau type, and has been in operation nearly a year. Two stacks, each containing six benches of ten retorts, have been in use for that time; the third stack not having been charged. The retorts are 13 ft. 2 in. long, 22½ in. by 9 in. at the top and 27 in. by 14 in. at the bottom, are 3 inches thick at the top, and increase to 4 inches at the bottom. The retorts are in two rows of five each; the producer being at the side lengthwise of the bench. The producer gas and air enter the setting at six places—four between the retorts, and one at either end of the bench.

There is one producer for each bench; the size of the grate being 3 ft. 4 in. by 4 ft. The total depth from the grate-bars to the charging-door is 18 feet; but, as the producer gas is taken off at a point about 3 feet above the grate, this figure represents the active depth when the fire is clean—the remainder of the height being available for storing coke. The combustion takes place at the bottom of the retorts, the products making four horizontal passes, alternately away from and towards the producer; leaving at the top of the setting, down through the recuperators, and under a steam generator, which supplies steam to the fire, thence to the main flue.

During the first few months, we had great difficulty in keeping the retorts hot enough at the tops without getting the temperature too high at the bottoms, where it would exceed 2500° Fahr., and yet not hot enough at the tops to carbonize the charges. We did not then determine the top temperature; but it probably was not higher than 1500° Fahr.—a difference of 1000°. By making some changes, the difference was reduced to about 500°, and the highest temperature to 2300°. These changes led up to the tests described below, which were planned and conducted by Mr. E. R. Hamilton, chemist of the works. I only give the results of the second series of tests, as the first were not complete, due to some of the junctions getting out of order and breaking. The figures obtained in the first substantially check with those of the second series.

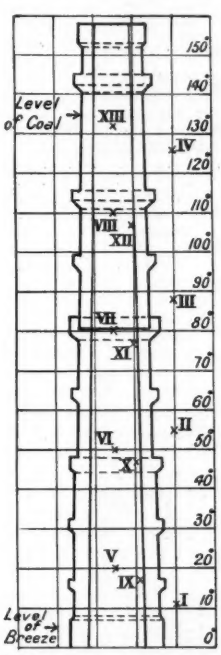


Fig. 1.—Diagram of Retort, showing Position of Temperature Measurements.

A retort was selected in the row farthest removed from the producer, on account of its being more available for placing the thermo-couples. Temperatures were taken at four points outside the retorts and at corresponding heights on the outside and centre of the charge. [See fig. 1.] A Wanner radiation pyrometer was used for taking the outside temperatures at the lower passes, and base metal thermo-couples at the other points. Temperatures were also taken at the top of the charge; the thermo-couple entering about 3 inches into the coal. Two 1¼-inch pipes were inserted into the retort through the top lid—one pipe resting against the side wall, and the other held in position in the centre of the charge. Two 13-feet and two 8-feet asbestos-covered junctions were used. One of each was placed in a ¾-inch pipe, and this pipe was inserted into the 1¼-inch. The smaller pipes, containing the junctions, were moved up and down so as to get the temperatures at each two corresponding points.

The temperatures were plotted into curves. The outside tem-

peratures are shown in fig. 2. and the inside in fig. 3. The curve numbers correspond to the position numbers in fig. 1. Curves 6, 8, 10, and 12 were not started until 10 a.m., because no readings were taken in these positions before that time, as we desired to take readings during the beginning of the charge at five-minute intervals, in order to show the sudden variations in temperature. It was impracticable to move the couples every five minutes; and the readings, at fifteen-minute intervals, which were taken after 10 a.m., would not have shown these changes. Before the hour named, doubtless these curves would approximate 5, 7, 9, and 11 respectively. Curves 9 and 10 stop at 1.30 p.m. because the couple broke. The retort had been scurfed just previous to the test, which was made during last August. The quantity of coal charged was 1100 lbs.; the moisture was 1·05 per cent.; and the volatile matter, 33·23 per cent. The ashes were all cleaned out of the fire at 8 a.m., and the fire was raked up at 11 a.m., at 2.30 p.m., and at 4.30 p.m.

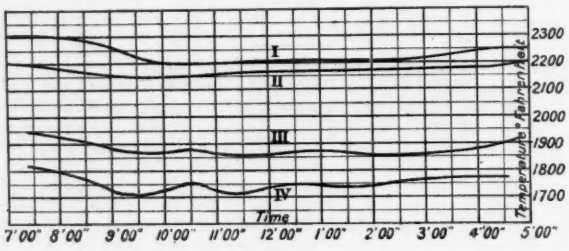


Fig. 2.

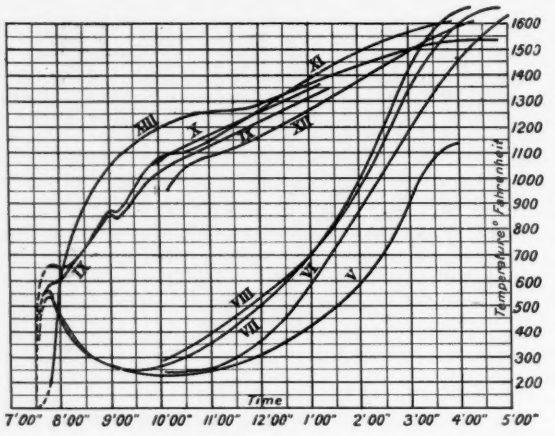


Fig. 3.

Some analyses of the coke taken from various parts of the retort lead us to believe that the coal is thorougly carbonized when it attains a temperature of about 1500° Fahr. However, in considering the equal heating of the charge, this figure need not be taken into account. Curves 5, 6, 7, and 8 would indicate that the temperature is too low at the bottom; that the coal at position 7 is carbonized about fifteen minutes before that at 8, and an hour before 6. We raised the bottom temperature slightly, and obtained better results; yet some portions of the charge were heated more than others—thus causing a waste of fuel. The curves would indicate that a thinner charge would be desirable. Though the temperature outside the retort at the bottom is higher than at any other point, the temperature at the centre remained far below the upper points. This may be accounted for by radiation from the lower mouthpiece, as well as by the thickness of the retort and charge.

The object of this paper is to describe the operation of our settings; and therefore I will not go further into the data at hand. However, it seems that from these tests there may be calculated the heat transmitted through the retort wall and body of coal for the various thicknesses and corresponding temperatures, which might be of some value in designing and applying heat to a retort-setting.

In the following table are given the results of operations for each of the months during the present year to July; 120 retorts being worked.

From time to time we have changed our methods of operating; and this accounts to a great extent for the variations in the results. Explanations of the several items in the table and of our methods are given below.

	Jan.	Feb.	March.	April.	May.	June.	July.
Time of charges	15 d. 10 h. .. 16 d. 9 h.	15 d. 9 h. .. 13 d. 10 h.	10 hrs ..	10 hrs. ..	10 hrs. ..	24 d. 10 h. .. 6 d. 11 h.	12 d. 11 h. .. 19 d. 10 h.
Number of retorts charged	8,996 ..	8,115 ..	8,484 ..	8,192 ..	8,329 ..	7,724 ..	8,173
Average weight of charge, pounds	962 ..	957 ..	990 ..	980 ..	1,022 ..	1,032 ..	979
Gas made, 1000 cubic feet	42,775 ..	37,739 ..	41,608 ..	39,522 ..	40,910 ..	38,132 ..	42,595
Do. per pound of coal, cubic feet	4·93 ..	4·85 ..	5·00 ..	4·91 ..	4·81 ..	4·78 ..	5·32
Candle power, flat-flame burner (Bray No. 7)	13·00 ..	12·78 ..	12·70 ..	13·40 ..	14·40 ..	14·12 ..	12·05
Candle-feet	64·10 ..	61·98 ..	63·50 ..	65 80 ..	69·30 ..	67·49 ..	64·10
Calorific power, B.Th.U.	615 ..	637 ..	625 ..	605 ..	606 ..	627 ..	637
Bench fuel per 100 lbs. of coal	19·64 ..	19·11 ..	18·87 ..	18·78 ..	18·62 ..	19·46 ..	20·34
Gas per ton (2240 lbs.) of coal, cubic feet	11,043 ..	10,864 ..	11,200 ..	10,998 ..	10,774 ..	10,707 ..	11,917
Tar per ton of coal, gallons	13·50 ..	15 80 ..	16 60 ..	15·94 ..	17·30 ..	17 74 ..	12·30
Ammonia per ton of coal, pounds	5·29 ..	6 27 ..	6·30 ..	7·05 ..	6·462 ..	7·085 ..	6·825
Coke made, per cent. of coal	70 ..	70 ..	70 ..	70 ..	70 ..	70 ..	70
Coal handled per man per day, tons	12·477 ..	12·353 ..	12·006 ..	11·957 ..	12·258 ..	11·9 ..	11·361

Carbon forms very rapidly in the retorts, particularly in the lower portions. We have tried various methods to reduce the time of scurfing; but the average time taken has not fallen much below forty hours. Each retort is scurfed every twenty days; thus causing a loss of capacity, from retorts being off, of something over 8 per cent. In addition to this, the amount of coal charged per retort decreases as the carbon on it increases. The average amount of carbon removed from a retort after being twenty days in service is 44 lbs., or 0·628 cubic foot, which is equivalent in volume to about 33 lbs. of coal—an average loss of 16·5 lbs. per charge, or about 1·6 per cent. Some recent experiments we have made would indicate that the scurfing-time may be reduced to a few hours.

The pressure of gas at the bottom of the retort is from 10 to 12 inches of water during the first period of the charge, and from 3 to 4 inches during the last few hours. Sometimes the charge hangs in the retort, which seems to be generally due to the extreme bottom of the retort being too cold.

We have made some experiments to determine the differences between the illuminating powers of the flat-flame and argand burners. The Sugg "D" burner averages about 3-candle power higher, and the "Metropolitan" No. 2 burner from 6 to 7 candles higher, when tested with gas of from 12 to 14 candle power in the flat-flame burner.

Coal is fed into the storage bins with a belt conveyor, the shoot of which constantly travels the full length of the retort-house. This shoot passes over a little hopper, which is made of such a size that it collects about one-fourth of 1 per cent. of the coal going into the bins. These samples are collected weekly, and crushed, quartered, and analyzed in the usual way. The coke is sampled and analyzed weekly.

The take-off pipes from the retorts are cleaned every two days. The hydraulic mains are equipped with pans, one under each dip-pipe. These pans, which catch the thick tar and the pitch, are emptied once a week. The dip-pipes are only sealed when the retorts are being discharged.

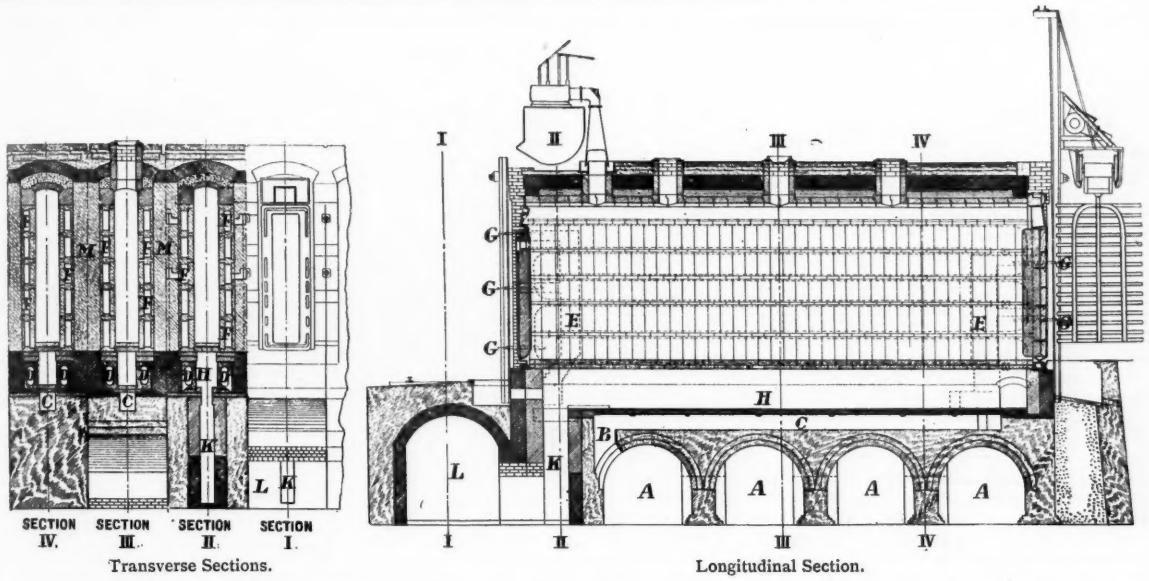
The producer fires are clinkered (with secondary bars in place) every 48 hours; the ashes are cleaned out (without the use of secondary bars) 24 hours after clinkering; and the fires are raked between the grate-bars every three hours. The coke charged into the producers is measured by volume; the measures having been standardized with kiln-dried coke. All the coke sold and used for other purposes is similarly measured. Large coke was at first employed in the producers; but we are now using 2-inch coke, as it gives a better producer gas on account of a larger hot surface being exposed. The amount of coke burned in the producers, per square foot of grate surface per hour, varies from 14 to 16 lbs.

DEVELOPMENT OF A BYE-PRODUCT COKE-OVEN GAS PLANT.

By Warren S. Blauvelt.

[A Paper read before the American Gas Institute.]

In December, 1899, the New England Gas and Coke Company began delivering the surplus gas from the bye-product coke-oven plant at Everett for general distribution and sale as illuminating and fuel gas; and the following year this pioneer plant produced for sale 1,427,155,000 cubic feet of gas. During the twelve years which have nearly elapsed since the plant commenced operation, the number of coke-oven plants in the United States from which surplus gas is sold for illuminating purposes has increased to eleven; and the total sales of coke-oven gas for general distribution have increased each year, except in 1908, until in 1910 they exceeded 12,000 million cubic feet, or approximately 23 per cent. of the total coal gas sold. Of the eleven coke-oven plants now delivering illuminating gas, all except one have been operated continuously since they started. In view of this record in the gas business of the United States, it is evident that the bye-product



Transverse Sections. Longitudinal Section.

A. Underground arches through which air for combustion passes on the way to the heating flues; thus serving to keep the substructure cool, and avoid loss of heat into the ground. B. Air riser to the recuperator system. C. First horizontal air-heating passages. D. Second horizontal air-heating passages. E. Vertical air-ducts through which heated air passes to the combustion flues. F. Oven-heating flues, in which combustion takes place. G. Gas burner pipes conveying gas to the oven-heating flues. H. Sole flues below the oven chambers through which hot combustion gases pass. K. Passages for combustion gases from sole flues. L. Main flue through which combustion gases from all ovens in a block pass to the waste boilers where all the steam required to operate the plant is generated. M. Division walls between the ovens, which support the brickwork above the ovens and serve as reservoirs absorbing heat during the latter hours of the coking process and giving up heat to the coking charge during the first hours of the coking period.

Figs. 1 and 2.—The Semet-Solvay Five-High Oven.

coke-oven method has in the past twelve years won for itself an enviable position among the standard methods for the manufacture of fuel and illuminating gas.

The bye-product oven was originally developed primarily for the purpose of manufacturing metallurgical coke. Hence comparatively little attention was given, either in the design or the operation of the older plants, to the problems upon the proper solution of which depended the success of the bye-product oven as a gas-retort. The yield of surplus gas was invariably low, seldom exceeding 60 per cent. of the yield obtained by good practice at the present time from similar coal. The calorific power of the gas was generally low and subject to great variations; and no satisfactory method of controlling its illuminating power had been worked out.

The first bye-product coke-oven plant built in America was a block of twelve Semet-Solvay ovens at Syracuse (N.Y.), which commenced operation in 1893. This plant was so successful that thirteen additional ovens were built and went into service in 1896. The same year some interesting experiments were made to determine the practicability of firing the ovens with producer gas, instead of oven gas. A detached gas-producer was set up; the gas was cooled, scrubbed to remove dust, and then burnt in the oven flues. This early experiment was entirely successful in proving the possibility of firing ovens with producer gas, and thus securing the entire make of oven gas for general distribution.

In October, 1902, the Semet-Solvay plant at Detroit (Mich.) began the delivery of its surplus gas to the Detroit City Gas Company. This plant has been used as an experimental station for working on many of the problems of design and operation of coke-oven plants and the manufacture of illuminating gas. It is the author's purpose to tell something of the progress made during the past nine years at the Detroit plant in the manufacture of illuminating gas in bye-product coke-ovens.

When the delivery of illuminating gas commenced, the plant consisted of thirty ovens which had been operated about thirteen months, and thirty ovens still under construction which were completed the following December. These ovens were 30 feet long, 7 feet high, with an average width of 16½ inches; and the regular oven charge was 6 tons of coal. The general design of these ovens is clearly shown in figs. 1 and 2. The heating flues were made of large Belgian tile; and as there were four of these superimposed flues on each side of the ovens, they were called four-high ovens. Clay fire-bricks were used in the division walls and in the recuperator flues, which, as will be seen from the diagrams, were directly below the oven chamber. The combustion gases, after leaving the recuperators, passed to waste-heat boilers, where they were utilized in generating steam, finally escaping at a temperature of about 550° Fahr.

The general plan of the plant as it now exists is shown in fig. 3. The oven plant consists of four blocks, numbered 1 to 4, of thirty ovens each, a small block of six ovens built as an extension of No. 2, and another similar extension of six ovens at the end of No. 3. The sixty ovens in Nos. 3 and 4 were completed and went into service in March, 1904. These ovens were similar in design to those built previously, but were 5 feet longer. The heating flues were built of small Belgian brick, instead of the large tile used in the older ovens.

The demand for coke in the district supplied by Detroit has increased every year since the plant was built, with the single exception of 1908—the year following the panic. The increase in the production of the plant to meet this constantly growing demand for coke has, therefore, been a constantly recurring problem. From 1904 to 1907 inclusive, it was solved by decreasing the coking-time nearly four hours, by which means coke production was increased about 16 per cent. To secure this result, however, it was necessary to operate the ovens at as high a temperature as the refractory materials then employed would stand. A further increase in coke production could be secured only by building more ovens or by rebuilding some of those existing, increasing their size, and using a higher grade of refractory material in their construction. After very careful consideration, it was determined that the latter plan for increasing the capacity of the plant would be the more profitable, though it involved the partial destruction of ovens which, after seven years' service, were giving

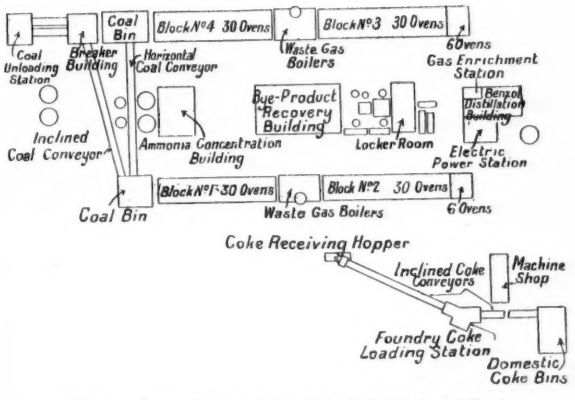


Fig. 3.—General Plan of the Detroit Coke-Oven Plant.

results superior to those obtained when first built, and which could undoubtedly be kept in operation for several years with comparatively small cost for repairs.

This method of increasing the capacity of the plant having been determined upon, between November, 1908, and May, 1909, block No. 1 was enlarged (a few ovens at a time, the rest of the block being kept in operation) by making the ovens higher. The covering was taken off above the oven chambers, and the heating flues were removed. The division walls were then built higher, and new heating flues were constructed of silica brick. These ovens were called "five-high," as they have five superimposed horizontal heating flues in each side.

During the summer of 1910, block No. 2 was rebuilt and enlarged to five-high. No change was made in the general design; but silica bricks were used in the division walls and silica slabs in the heating flues. Block No. 3 has been rebuilt along the same

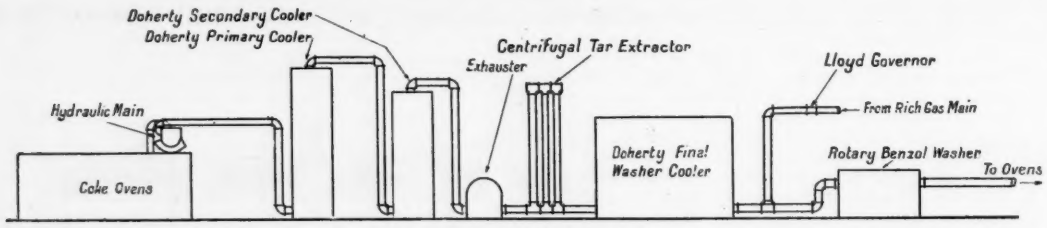


Fig. 4.—Diagram of Fuel-Gas System.

lines during the past summer; and it is intended to rebuild No. 4 during the summer of 1912.

In some places where large quantities of coke are consumed, there is no market for gas. In others, the demand for gas far exceeds the surplus which would be produced in making enough coke to supply the local market. Prices obtained for coke and gas and the cost of generating steam also vary greatly in different localities. In order to determine the type of oven best adapted for each of these varying conditions, the Semet-Solvay Company decided to build at Detroit several ovens of different types.

In August, 1909, six experimental ovens, built of silica material, and similar in all respects to the old standard type of Semet-Solvay oven, except that they are equipped with an improved and enlarged form of recuperator, were put into regular service. With these recuperators, the air used for combustion in the heating flues is heated to a temperature of about 1400° Fahr., or some 600° higher than with the older and simpler form of recuperator. The better transfer of heat from the combustion gases to the air resulted in a decreased consumption of fuel gas per ton of coal carbonized. As the combustion gases leave the recuperators about 500° Fahr. cooler than the gases leaving the old style of recuperators, their value for generating steam in the waste-heat boilers is greatly reduced.

In October, 1909, six more experimental ovens were put into service. They were arranged so that they could be fired with producer gas or with oven gas at will. Outside regenerators were provided, in which both the air and the producer gas used to fire the ovens were heated. The results obtained with these ovens were quite unsatisfactory, owing mainly to leaks which early developed in the various flues connecting the ovens with the regenerators. It was therefore decided to abandon the outside regenerators, and rearrange the oven heating system. Three ovens were rebuilt equipped with individual regenerators, and were arranged to be fired with oven gas. Two ovens were rebuilt equipped with improved recuperators, and arranged to be fired with oven gas or producer gas at will. The producers—one for each oven—were built below the oven chambers at the pusher end. In the design and operation of these ovens, the principles employed in the Doherty economizer benches were successfully employed. Coke was used for fuel, and the entire make of gas was available for sale. These two ovens are of special interest to the gas fraternity, as they were the first gas-ovens—bye-product coke-ovens so designed and operated that all the gas distilled from the coal carbonized therein is available for sale—commercially operated in the United States.

The results of these two experiments were quite satisfactory; but there were a number of details in which it was evident that, with the experience gained in five months' operation, some improvement could be made. It was therefore decided, during the past summer, to rebuild these six ovens, equipping them with individual regenerators, and arranging them to be fired with oven gas only, and to build three new ovens to be fired with producer gas on the Doherty economizer system or with oven gas at will. Construction work on these ovens is now under way.

In the accompanying table are given the results obtained per ton of dry coal coked with various types of heating systems employed, when using coal averaging 26 per cent. of volatile matter; the coking period in each case being twenty hours.

Type	No. 1	No. 2	No. 3	No. 4	No. 4
Number of flues high	Four	Five	Five	Five	Five
Material used for division walls	Fire-clay	Fire-clay	Silica	Silica	Silica
Material used for oven flues	Belgian tile	Silica	Silica	Silica	Silica
Air heated in	Sole flue recuperators	Sole flue recuperators	Sole flue recuperators	Improved recuperators	Improved recuperators
Fuel gas required, cubic feet	6800	6200	5500	5300	—
Fuel gas, B.Th.U. per cubic foot	525	517	505	501	—
Surplus gas, cubic feet	3900	4500	5200	5400	10,700
Surplus gas, B.Th.U. per cubic foot	610	610	610	610	556
Steam from waste heat, lbs.	950	900	400 Estimated	400 Estimated	500 Estimated
Coke required for oven fuel, lbs.	—	—	—	—	235

In the original installation, each block of ovens was equipped with a double hydraulic main, having separate compartments for rich and lean gas. Duplicate gas condensing and washing systems were provided for the rich and lean gas. Each system consisted of eight tubular condensers and two bubbling ammonia washers; a spare washer being provided, which could be used for rich or lean gas at will.

As the daily coke output of the plant was increased, it became necessary to enlarge the capacity of the gas condensing and washing apparatus. After a series of experiments with a Doherty washer-cooler, it was decided in 1909 to replace the tubular condensers and the bubbling washers with this type of apparatus. Four single-compartment washer-coolers, each 8 feet in diameter, were installed, to be employed as condensers. Two of these are used in series to cool the rich gas; the other two, also in series, cool the lean gas. A four-compartment washer-cooler, each section 8 feet square, which had been used in the preliminary experiment, was put into regular service as a final ammonia washer for rich gas. A five-compartment apparatus, each compartment 7 ft. 6 in. square, was installed as a final ammonia washer for the lean gas. Each set of apparatus has been found by actual test to be of ample capacity to deal with 10 million cubic feet of gas daily. The ground area occupied by the new condensing and washing plant is only two-thirds that required by the old apparatus of half the present capacity. The gas condensing and washing systems are shown in diagram in figs. 4 and 5.

When gas deliveries commenced, the nitrogen content varied from 3 to 12 per cent.; and the calorific power, as much as 75 B.Th.U. per cubic foot. This difficulty was obviously due to leakage through the oven walls, induced by variations in pressure. Owing to the permeability of refractory materials, it was, of course, impossible absolutely to prevent leakage through the oven walls if the pressure within the ovens or in the adjacent heating flues differed materially from the atmospheric pressure. To prevent leakage, therefore, it was necessary to devise a method which would automatically control the gas pressure in the ovens. Experimentally it was found that a satisfactory yield of gas, uniformly low in nitrogen—that is to say, below 4 per cent.—could be obtained from a block of coke-ovens only when the variations of gas pressure in the hydraulic main were less than 0·03 inch water column.

A period of about two years was consumed in developing a practical governor capable of controlling the pressure variations within these narrow limits. During the two years, the only practical method of avoiding leakage of air into the ovens was to run with so high a mean pressure that the pressure in the ovens was above that of the atmosphere, even when the pressure at the hydraulic main was lowest. As a result, the loss of gas due to

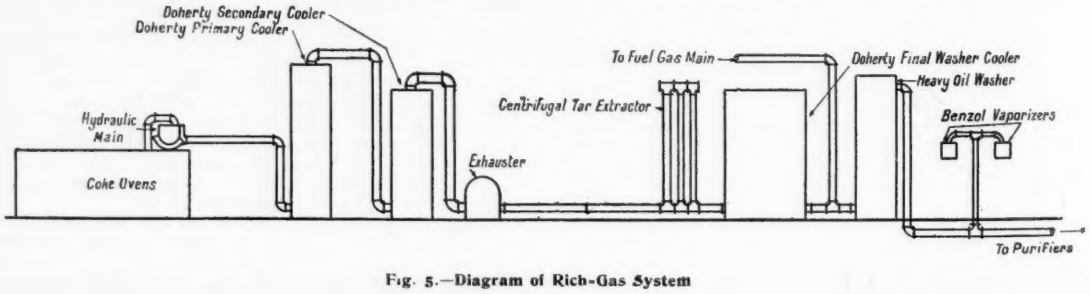


Fig. 5.—Diagram of Rich-Gas System

leakage from the ovens was excessive, and the yield of surplus gas was materially reduced.

After successful pressure-controlling mechanisms were devised and installed, it became a comparatively simple matter to control the calorific power of the gas. From the coal used at this plant, the gas produced during the coking process varies from about 700 B.Th.U. per cubic foot when an oven is freshly charged to about 350 B.Th.U. at the conclusion of the coking period. If all the surplus gas were the richest portion, it would average about 650 B.Th.U. per cubic foot. As the gas from any oven may be delivered to the rich or lean gas systems at will, it is obviously a comparatively simple matter to so vary the separation as to deliver all the surplus gas at any required calorific power between 500 and 640 B.Th.U. per cubic foot. In practice, it is customary to vary the calorific power as the illuminating power is changed, as follows: 15-candle gas, 605; 16-candle gas, 620; 17-candle gas, 635; 18-candle gas, 640. As no gasholder is used, calorific determinations made on the gas as delivered direct from the plant frequently vary as much as 20 B.Th.U. from the standard. But the average of all determinations for a period of twelve hours is seldom more than 5 B.Th.U. below, or more than 10 B.Th.U. above, the standard required.

In order to ensure the control of the illuminating power of the gas delivered, so as to meet the requirements of the gas company, a water-gas set was installed; and water gas was used for enrichment till March, 1904, since which date benzol has been employed for the purpose. Benzol enrichment proved quite satisfactory till the following winter, when trouble began. When the temperature dropped, the illuminants condensed, and the candle power of the gas was low. With a rising temperature, this condensate was taken up by the gas, and the candle power was too high. This difficulty was reduced somewhat by the use of a higher grade of benzol during the winter months; but it was not entirely overcome until 1908, when apparatus was installed for washing the gas, before enrichment, with an absorbing oil, which removed practically all the naphthalene and other condensable hydrocarbons. Since this apparatus has been in use, there has been no appreciable difference between the candle powers immediately after enrichment and those observed at the gas company's station about 2½ miles distant; and the enriching value of the benzol used has been as high in the winter months as during the summer.

At the Detroit plant, the production of an exceptionally high grade of foundry coke has always been considered of first importance. To secure this desired result, it was early discovered that a better quality of coke could be made from a mixture of coals of which one is very low in volatile matter than from any one coal coming into the Detroit market. The best foundry coke has been made from a coal mixture containing from 25 to 26 per cent. of volatile matter. From such a coal, the yield of gas and other volatile products is necessarily much lower than would be obtained from a good gas coal containing 32 to 34 per cent. of volatile matter. Notwithstanding this handicap, the normal yield of gas per ton of dry coal (nitrogen content in the gas not exceeding 4 per cent.) varies from 10,400 to 10,800 cubic feet when coking in twenty hours. With higher heats and a shorter coking period, the total make of gas is materially increased. No accurate determinations have been made of this increased make of gas due to higher oven temperatures; but the results obtained from the entire plant when one block was operated for several weeks at 16-hour coking-time indicate that the yield of gas per ton of dry coal from this block approximated 11,500 cubic feet.

As the design and operation of bye-product ovens have been improved, additional knowledge has been gained as to the kinds of coal best adapted for use in the manufacture of the various grades of coke desired in various industries; and much has been learned of the effect of different rates of carbonization on the quality of coke. As a result of this increased knowledge, grades of coke specially adapted to various uses are now made; and the prejudice formerly existing in the iron industry against bye-product coke has almost entirely disappeared.

The sale of crushed coke, mainly for use as domestic fuel, is increasing rapidly, as shown by the sales from the Detroit plant, which during the last three years were as follows: In 1908, 42,797 tons; in 1909, 62,704 tons; and in 1910, 106,385 tons. The sales to date this year indicate that at least 150,000 tons of domestic coke will be delivered in 1911.

During the past decade, all the difficulties which tended to prevent the successful operation of a bye-product oven gas plant in a suitable location have been satisfactorily overcome. In thermal efficiency and in total yield of gas, this oven compares favourably with the best gas-benches. The development of the type of oven which may be heated by burning producer gas or oven gas at will provides a simple and satisfactory method of adjusting the daily make of gas to the demand, without changing the rate of carbonization. Variations in the heating and illuminating power of oven gas may be controlled within very narrow limits. All doubt about the possibility of disposing of a greatly increased tonnage of bye-product coke has been removed, in great sections of the country, by its adoption for use as a metallurgical and domestic fuel.

The achievement of these results in the development of the bye-product oven method of carbonizing coal makes possible, in the manufacture of coal gas on a large scale, those economies in construction and operation due to the use of large units, which have proved of such enormous value in the manufacture of iron and steel, in transportation by rail and water, in generating electric power, and in digging the Panama Canal.

HIGH-PRESSURE DISTRIBUTION IN CALIFORNIA

At the last meeting of the Pacific Coast Gas Association, Mr. C. S. S. Forney, of the Southern Counties Gas Company of California, submitted a paper in which he gave particulars of the Company's system of high-pressure distribution. He explained that the compression of gas had made it possible for them to afford a supply to remote districts and small isolated communities which would not otherwise have had the benefits of this useful illuminating and heating agent. At the same time, this class of distribution represented comparatively high maintenance and operating costs, as the meter-reading and the collection of accounts in arrear involved considerable expense for transportation and loss of employees' time.

The Company have approximately 6000 meters served from high-pressure trunk-lines and high and low pressure distributing systems. The former are operating under a pressure of 20 lbs., and in some cases more than this. Three small plants have been shut down; but they are maintained as a reserve against possible interruptions in sections of the high-pressure mains. It is hoped eventually to have the entire system served by two plants, operating at each end of the through trunk-line—a distance of about 75 miles. When this condition is reached and the line completed, the system will be serving about 12,000 consumers. They are supplying seventeen towns, and maintain an office in each.

In laying the mains, the trench is graded with almost as much care as though low-pressure mains were being put down. At the time of laying, the couplings are unscrewed, liberally coated with red lead, and then reversed; and in practically 70 per cent. of the connections the engineer finds he is able to utilize all the threads on the pipe—thus making the connections good from a frictional as well as a mechanical standpoint. He has a large portable air-compressor, with which he fills the mains with air up to 100 lbs. pressure. Each joint is then carefully tested with soapsuds; and then the lines are considered to be as well laid as possible. Expansion joints are inserted in the line at various points, such as river crossings, corners at the ends of long sweeps, &c.; and the line is liberally provided with valves. The expansion joints and valves are set in concrete boxes, with cast-iron manhole covers, very similar in design to those used in conduit work in cities, only smaller.

The author stated that what he calls "suburban" gas distribution is growing in importance each year, especially in Southern California. In the Company's southern division, supplying the cities of Santa Ana, Anaheim, Orange, and Fullerton, they have a generating plant at Santa Ana, serving the entire district. The high-pressure trunk-line is 4 inches in diameter and 12 miles long, and carries gas under a pressure varying from 10 lbs. to 20 lbs. This territory includes a population of about 25,000 people, who were formerly supplied from four plants, and offers an excellent opportunity for what might be termed "intensive suburban distribution." From Santa Ana, with 10,000 inhabitants, it is a distance of three miles to Orange, with a population of 5000; from Orange it is four miles to Anaheim, with one of 5500; from Anaheim it is three miles to Fullerton, with one of 3500; while along the road traversed by the high-pressure trunk-line there are about twenty houses to the mile.

The gas for this section is manufactured at Santa Ana, and compressed through receiving-tanks to a high-pressure trunk-line, which is 4 inches in diameter over the entire distance. The eventual plan of this particular group is to extend the line a further distance of 13 miles to Whittier. As the high-pressure line passes through Santa Ana, it is utilized to serve certain sections by district regulators.

At the plants which have been shut down, the holders are kept full, and held in reserve in case of interruption of the supply furnished by the high-pressure trunk-line; small compressor plants being maintained to utilize the gas stored.

Yorkshire Junior Gas Association.—We learn from the Hon. Secretary (Mr. Edward Garsed, of Elland) that arrangements have been made for members of the Association to visit the Soothill Wood Colliery Company's coke plant on Saturday afternoon. In the circular notifying the fact, he points out that the visit will be of exceptional interest to the members, as the ovens, coal-washing arrangements, and ammonia plant are quite different in type from any they have yet inspected.

Power from Peat.—According to a communication to "The Times" by their Dublin correspondent, a successful attempt appears to have been made to use peat instead of coal for industrial purposes. A 400 H.P. gas-engine was installed two months ago in Robb's linen factory at Portadown. Mr. Robb's manager states that with this engine an outlay of £6 a week on peat produces the same energy as was secured by an expenditure of £13 16s. 3d. a week on anthracite coal. The new process has, he says, the further advantage of extracting tar from the peat to the amount of 5 per cent. of the total weight of the fuel. An equivalent of 30 per cent., or 35s. a week, is obtained from this bye-product—reducing the weekly bill for fuel to £4 5s., as compared with a former expenditure of £13 16s. 3d. It is stated that these calculations have been confirmed by professional experts of high standing.

ECONOMY IN THE DESIGN AND CONSTRUCTION OF GAS-WORKS.

Abbreviated Report of the Discussion on Mr. Evetts' Paper.

In last Tuesday's issue of the "JOURNAL," some extracts were published from the paper that Mr. GEORGE EVETTS, Assoc.M. Inst.C.E., read at the meeting of the Junior Institution of Engineers, the previous evening, in the Lecture Hall of the Institution of Electrical Engineers. The paper was a long one; but even then, in view of the large scope of the subject, it was not so complete as the author could have wished it to be. The discussion on the paper was an interesting one.

The CHAIRMAN (Mr. Walter T. Dunn) asked those present to join him in expressing thanks to Mr. Evetts for his valuable and interesting communication. There was no doubt that those who were engaged in gas-works construction would find very much in the paper which would be of use to them.

The proposal having been acted upon,

Mr. H. O. CARR (Wandsworth) congratulated the author upon his valuable and able paper. Those who might be designing parts, or the whole, of a gas-works could use it as a book for reference, and by consulting it avoid many little pitfalls that might otherwise occur. The author very rightly insisted throughout his paper upon the importance of the question of economy; and he (Mr. Carr) thought he was in this regard very much to the point in many of his observations. By economy, he meant true economy in the design of gas-works. He did not merely look at the question from the point of view of the saving of labour costs alone, but he thoroughly took into consideration capital outlay as well. He then amalgamated the two, and studied the point as to whether or not it was actual economy. As the author properly pointed out in the paper with regard to small works, it was necessary to be very careful not to crowd them with too much machinery. If one did this, the works might be overdone on the capital side, and there would not be true economy or saving. It was also pointed out in the paper that more or less new systems of retort-benches had come into operation of late years in connection with regenerative settings. The system of three retorts abreast in settings of eights was giving place to beds that were higher, and had the retorts two abreast in tiers of four or five. This undoubtedly was a very great economy in ground space; and, of course, a great deal more gas was produced on a given ground area. Among other up-to-date methods, the author pointed out the economy in building retort-houses of steel construction, with just enough cover to keep the weather out. By this means a strong house for the purpose was obtained while not much was spent on any part other than the steel construction. Speaking of the stage-floor system of retort-house, he (Mr. Carr) did not think there could be anything better than what was known as the gravity system of working—that was to say, taking the coal up to a high level, and then, by machinery or otherwise, charging it into the retorts, and afterwards allowing the resultant coke to fall into trucks, and then taken away. This was much better than having the coke brought up again to a higher level. With reference to the jointing of cast-iron plates with planed joints, he (Mr. Carr) favoured the system of using a little red lead, and also placing a strand or two of lead wire between the flanges, and then drawing the joints tightly together. This seemed very successful against the leakage of tar or other liquid. As to gasholders, the author had not spoken of the practice which had become the vogue with respect to the economizing of gasholder capacity—that was by means of what was known as the booster. By this, in these days of higher gas pressures, one could draw gas out of a holder (which would not be able otherwise to give the requisite district pressure), and put it into the mains at a high pressure. The paper, to his mind, spoke well of the training Mr. Evetts had had in true gas-works constructing economy.

Mr. T. A. WATSON remarked that the paper referred to reinforced concrete, with which he had had a little experience. The author said: "If the principle of reinforced concrete be rigidly enforced—viz., that the steel reinforcement is to take the tension—it is clear that the amount of steelwork required would be as much as that necessary for an ordinary steel tank." That was to say, the steel required in a reinforced concrete tank would be as much as for a steel-plate tank. He (Mr. Watson) would like to point out that in a steel-plate tank, the plates had to be lapped, and had to be drilled or punched for rivet holes, and as the rivet holes had to be at intervals of (say) 3 inches, there was an actual saving of metal to the amount of 37 per cent. by adopting reinforced concrete, because the bars had no holes taken out of them, and the tensile reinforcement took up the whole of the tensile stresses. The author said the reinforced tank was not making much headway. It was quite true there were very few tanks of the depth of 40 feet so far built in England; but a great number of storage tanks of a greater depth than 40 feet had been built in America and Canada. Tanks had, in fact, been constructed there up to a depth of 100 feet, and 52 feet in diameter. He knew of a proposal in England to build a tank to a height of 72 feet and 98 feet diameter; and he hoped to have the pleasure of erecting it. The author had also referred to the difficulty of making tanks water-tight, and suggested rendering or puddling. Rendering was absolutely unnecessary, if the concrete was properly mixed and properly placed. He knew of two tanks, 36 feet up in the air, which were constructed wholly of concrete, without any rendering or any other material except concrete. They had no lining of any kind; and yet they were absolutely bottle-tight. The placing of reinforcement in tank walls did not require a great deal of care. By putting verticals at sufficient intervals, and tying the horizontal reinforcement to the vertical reinforcement, one could make certain of getting the proper spacing throughout the whole of the material. He should like to have the pleasure of constructing a reinforced tank for the author, as he was sure a large economy could be made on the steel tank.

Mr. BERNARD F. BROWNE added his congratulations to those of Mr. Carr and the other speakers on the excellence of the paper. He was sorry the author had fired off so many rounds simultaneously, because there was enough material in his paper to have made three very good ones, and long ones at that. He was afraid Mr. Evetts had given somewhat of a wrong impression in regard to the exchange of gas-works plant, which he led them to understand was a matter of frequent occurrence among gas companies. It must not be supposed for a moment that such a circumstance was common for one gas engineer to go to another and say: "Look here, I have a holder to 'swop;' what have you to give in exchange?" Few gas-works were built with second-hand plant; and those that were were not a great success.

Mr. LEWIS H. RUGG remarked that at Leigh-on-Sea they had constructed a reinforced concrete tank, 64 feet in diameter and 30 feet in depth. In the position in which it was situated, it had a special advantage. Sea water was almost in contact with the tank; and had it been of iron, it would probably have had to be covered with concrete to protect it.

Mr. W. T. HOGG (Mitcham) remarked that the author's paper did not convey to those members who had never been inside a gas-works the exact nature of the processes that went on there. In fact, one had to live on a gas-works four or five years to get thoroughly versed in them. The author spoke of the gas being driven off from the retorts at a temperature of 1400° Fahr.

Mr. EVETTS: That is as it leaves the mouthpieces.

Mr. HOGG observed that those who were not acquainted with the subject might imagine that this was the temperature in the retorts, and, of course, it was a low figure. He also thought that for coke removal in the retort-house, the author might have shown as modern practice a coke-conveyor, instead of an antiquated truck.

Mr. EVETTS: I have shown one, alternatively, on one of the diagrams.

Mr. HOGG (continuing) said the author incidentally mentioned vertical and inclined retorts; but he (Mr. Hogg) considered he might have given the members, in a constructional paper, a little more information about the present position of vertical retorts, as he was sure a description of the continuous method of carbonizing would have afforded a better impression of the economical carbonizing operations carried on in gas-works. In the reference to carburetted water-gas plant, the author remarked that "the purifiers should be proportionately larger than those for coal gas—say, 1 square foot per purifier per 1000 cubic feet a day." At the works where he (the speaker) was engaged, they had "a little fun" with $\frac{1}{3}$ square foot per 1000 cubic feet.

Mr. T. J. TAPLIN appreciated the detailed account of costs the author had given.

Mr. FRANK JONES asked whether Mr. Hogg, who had spoken of the truck method of coke removal as being antiquated, had had any long experience of any particular coke-conveyor, and what were the costs of upkeep? It was only curiosity, but he should like to know whether he had had a coke-conveyor at work very long, the tonnage of coke it had dealt with, the cost per ton per year, maintenance charges, and how rapidly it required renewal. There were coke-conveyors which had to be renewed from end to end in one year. Although it might be very nice to see them doing their work well, his experience was that the cost was high. The ones that he had had some knowledge of did not last long; but if there was a new coke-conveyor that could economically take the place of the old-fashioned trucks, he personally should like to hear of it.

Mr. HOGG replied that the conveyor was West's; but off-hand he could not give the costs. He would, however, do so, if his chief gave him permission. The conveyor had worked, practically without any trouble, the last three years. During this time, he daresay that probably 150,000 tons of coal had been carbonized in the house. It had worked absolutely to satisfaction; such little trouble as there had been having been due only to trifling mechanical details.

Mr. EVETTS, in the course of his reply to the discussion, said he had been very gratified by the kind words of everybody who had commented on the paper. Mr. Carr had referred to the use of boosters, and said that he omitted to mention them. It was not entirely so. Early in the paper he said: "In modern distribution, by the use of boosters for long-distance transmission, the diameter, and therefore the cost, of trunk mains may be reduced." This showed that he had not altogether omitted the question of boosters, though he freely admitted that the particular aspect of their use to which Mr. Carr drew attention—the reduction of storage, or the cost of storage—had not occurred to him. Mr. Watson called him to task for his disapproval of reinforced concrete gasholder tanks. He (Mr. Evetts) thought Mr. Watson was rather doubtful about the precise use of gasholder tanks. They were for holding water only; and therefore Mr. Watson's expe-

rience of water-tanks would be of the right kind for tanks that would be necessary for gasholders. But in regard to steel tanks, Mr. Watson mentioned 37 per cent. extra weight for lapping and riveting. It was found by close estimating that the whole of the rivets and the laps in a steel-plate tank amounted to only 7½ to 12½ per cent.—at the very outside, or an average of 10 per cent. When he spoke in the paper of reinforced concrete tanks, he should have said that "the steel work required would be as much as that necessary for a steel tank, less 10 per cent." That he took account of the difference in cost was shown clearly by the remark: "Although this reinforcement costs less in price per ton than the riveted tank work, the difference in cost is more than balanced by the cost of the concrete." His own experience was that reinforced concrete was dearer than steel tank work. He had many comparative costs; and he had never yet found that they could get such a good job from reinforced concrete as from a steel tank, given equal costs. Mr. Watson also mentioned the question of safety with reinforced concrete; and he referred to the fact that he (Mr. Evetts) suggested puddling or rendering the tanks. This was a thing that was actually done to keep gasholder tanks water-tight. Looking back over the past forty or fifty years, nearly all gasholder tanks that had been built if of brick had been puddled, or if of concrete rendered. [The author quoted briefly the results of some experiments made by the New York City Water Board in 1907 on a reinforced concrete cylinder of high-grade concrete, showing the considerable leakage under various heads, and how the leakage was reduced by applying grout when under tension, and pointing out that the Board now limited the working tension in the reinforcement.] Therefore he thought that he was justified in his attitude towards reinforced concrete gasholder tanks. Taking cost for cost, he should never choose a reinforced concrete tank in place of a steel one. Mr. Browne spoke of the use of second-hand plant in gas-works; and he said it was not a common thing for one gas engineer to go to another, and say that he had a piece of plant that he wanted to "swop." The engineer did not say "swop;" he said "sell." And the sale of plant that had become too small at one works to a works of less magnitude, was a thing that was going on, if not every day, at least every week. Mr. Hogg had mentioned coke-conveyors; and Mr. Jones had asked for details. He hoped that Mr. Hogg would supply them. The last-named gentleman also referred to vertical retorts. He (Mr. Evetts) had not overlooked either vertical or inclined retorts; but he had said that he had had no direct experience of them, and so he would not enter into them in detail. The various works with which he was connected all had good working results under the horizontal system. There was no doubt the vertical retort was the thing of the moment; but he did not feel justified in talking about a subject of which he did not know much. There was no doubt, however, that the remarkable results recently obtained from horizontal retorts with stoking machinery had had the effect of retarding the progress of vertical retorts in this country. As to water-gas purifiers, Mr. Hogg said that, at the works where he was engaged, they had "a little fun" with ⅓ square foot per 1000 cubic feet of water gas per day. He (Mr. Evetts) had no doubt that they had. [Laughter.]

NOTES ON CARBONIZING.

By Ernest Astbury, of Liverpool.

[Manchester and District Junior Gas Association Paper, Nov. 4.]

Carbonizing, as you are of course aware, is the most important branch in the manufacture of coal gas; and the object of this paper is to give a short description of the plant in use for this purpose at the Linacre works. At the present time there are two systems—namely, inclined and horizontal retorts; but before describing them, I should like to mention a few particulars that are common to both.

The Settings.

The retorts are heated by Gibbons's regenerative furnace. There is for each setting a separate furnace, which has been made as large as possible, so as to avoid frequent clinkering; and consequently the fires are cleaned every 48 hours only. The furnace-arch is built with the top of the crown about 21 inches below the bottom retort, thus ensuring an even distribution of the heat to each retort. The combustion chambers, nostrils, ports, and flues are made of ample size, so that the speed of travel of the gases and air may be low, and allow of their gradual mixture and combustion in the circuit of the retorts. This provision prevents local heating. The following are the average temperatures, viz.: Top retorts, 1930° Fahr.; middle retorts, 1934° Fahr.; bottom retorts, 1855° Fahr.; and combustion chambers, 2429° Fahr. It is the custom to make frequent analyses of the furnace and waste gases, and also to keep a careful watch over the fuel account by taking weekly stocks of coke.

Ascension-Pipes and Hydraulic Mains.

The gas is taken off each retort by one ascension-pipe only; this being 8 inches in diameter. Special mention might here be made of the position of the hydraulic main, which is placed 3 to 4 feet above the retort-bench. This, in addition to preventing the heat of the retort-bench volatilizing the light hydrocarbons of the tar in the main, also provides ample space for the valves and tar mains leading to the Dillamore columns. It is found that the best results are obtained when one of these Dillamore columns is used in connection with not more than four beds of retorts.

The coal-handling plants and storage-hoppers have, with one exception, already been fully and ably described to you by Mr. R. E. Gibson, Assoc.M.Inst.C.E., the Assistant-Engineer, in his paper read on Oct. 3, 1908,* so that it is quite unnecessary for me to refer to them here.

Inclined Retorts.

There is in No. 1 retort-house, S works, an installation of inclined set in four tiers. Each of these retorts is 20 feet long, of D section, consisting of one bench of eight beds of eight retorts, each 24 in. by 16 in. at the bottom, tapering to 21 in. by 16 in. at the top. These are worked with eight-hour charges of 10¼ cwt. each, or a total of 96 tons of coal per day, allowing for retorts idle for scurfing. Six and twelve hour charges have also been tried, with varying results. With six-hour charges of 7½ cwt. each, it was found, when using rough coal, that the charge ran down in a thick layer to the bottom end of the retort, and was not properly carbonized when drawn; the result being a low make of gas per ton, and also poor coke. Completely filled retorts, or twelve-hour charges of about 14 cwt. each, while giving excellent results, have their drawbacks. Firstly, the drawing of the coke is most laborious, especially if the charge has swelled or the retorts are old and uneven. Secondly, the coal must always be rough to get a full charge into the retort. Both of these disadvantages may, however, be overcome by using large nuts, or by mixing a fair percentage of cannel with the coal. But the extra expense of the latter method neutralizes the gain obtained by working the heavy charges. There is also an objection to the employment of shift men for so long a period as twelve hours. At Liverpool, the eight-hour shift was first introduced; and the rule will not be departed from excepting for very good reasons. After careful experiments with the three charges, the eight-hour charge has been found to be the most suitable for the class of coal used at these works.

In this installation, the coal is stored in continuous hoppers, being drawn therefrom into travelling measuring chambers, which carry the shoots for charging the retorts—there being one for each tier. The coke is discharged into iron barrows, through openings in the drawing-stage, and is then wheeled out into the yard, where it is tipped and quenched.

Horizontal Retorts.

No. 2 retort-house, S works, contains 29 beds of sixes operated by Fiddes-Aldridge simultaneous charging-discharger machines. Most of you will, no doubt, be familiar with the construction and working of these machines, which have now become quite general. Since the installation of the first machine in Liverpool in 1905, experience has suggested many improvements, so that a high state of efficiency has been obtained by the makers. The retorts are 20 feet long, 23 in. by 16 in., and of a special section to suit the machines. Eight-hour charges are at present being worked. The weight of each is 10½ cwt. when coal alone is used, or 10¼ cwt. with a mixture of coal and cannel. In passing, attention may be called to the coal-storage hoppers of the P and Q benches, where, in place of the usual push-plate conveyor, one of the tipping-tray type has been fixed. This conveyor has given great satisfaction, and requires very little attention and power, while, furthermore, there is a minimum of wear and tear.

Coke-Handling Plant.

The coke in this retort-house is dealt with by a telpher transporter; the machine travelling on an overhead monorail supported by girders and lattice stanchions. The open skip, which is suspended from the machine by wire ropes, is of sufficient capacity to hold the coke from two retorts. From the top and middle tiers the coke is discharged directly into the skip, placed on the retort-house floor. With the bottom retorts, an inclined plate on a small carriage enables the greater portion of the charge to be pushed into the skip with a minimum of handling. The coke remaining on the plate is afterwards used for feeding the producer. As the hot coke is received in the skip, it is partly quenched by water from hose-pipes. The skip is then raised by the telpher machine and carried out of the retort-house into the yard, where the quenching is completed by immersion in an elevated water-tank. This method of quenching is far from an ideal one, as the coke is in danger of being saturated with water, and so may become very heavy and badly broken. This results in the production of a large percentage of breeze, a portion of which, on raising the skip, remains in the tank, necessitating its removal twice daily.

Experiments are at present being made to overcome these drawbacks; and fairly satisfactory results are obtained by the adoption of the following method: In place of a tank full of water, it is filled to the depth of about one foot only, and around the top a pipe from a high-pressure main sprays fine jets of water on to the coke. As this does not quench the coke quite so rapidly, it is not broken up to anything like the extent to which it is when completely immersed. Further, the coke is drier, brighter, and of better quality.

After quenching, the coke is discharged into the yard or on to a Bentley's screening conveyor, which removes the dust and at the same time fills storage-hoppers with the large coke. It is when the coke has to be put into the yard that one appreciates the

*See "Journal" Vol. CIV., p. 50.

great advantages of the telpher transporter over the coke-conveyor, for the skip is lowered practically to the ground before being discharged, and, as the tipping movement is similar to that from an ordinary wheelbarrow, the breakage of coke is obviously reduced to a minimum.

At one end of the storage-hoppers, in order to meet special demands, a Cort's coke-breaker is provided, which reduces the size to about 1½-inch cubes. After screening, it is elevated by a tipping-tray conveyor to some adjoining bunkers.

North Works.

In this section there are three retort-houses forming one building, all containing horizontals. In one there are fourteen beds of sixes, hand charged and drawn. In the other two there are 26 beds of sixes charged by Arrol-Foulis hydraulic stokers working in conjunction with a Williams-M'Phee coke-discharger.

The retorts, which are Ω section, 22 in. by 16 in. by 18 ft. 6 in. long, are worked with eight-hour charges of 10¼ cwt. each, and give similar results to those obtained from the S installation. The charging-machines receive their coal supplies from storage-hoppers fixed outside at one end of the building. Here, also, is the usual coal breaking and handling plant, which is fed from a bunker placed under the elevated railway siding; this being filled directly from the waggons. The machines travel one on each side of the benches; and the retorts are charged simultaneously from each end. The coke is pushed out by the discharger into iron barrows, and wheeled into the yard, where it is quenched and stored. Referring to the Williams-M'Phee discharger, it may be here remarked that the machine consists of a pusher constituted of telescopic rams and cylinder fixed on a steel channel beam, which is suspended within a strong angle framework. The outer cylinder of the pusher is 4½ inches internal diameter, and the intermediate 3 inches internal diameter by 3½ inches outside diameter. The inner ram is 2½ inches diameter. Each ram is provided with a stopper at its rear end.

On the inner ram is fitted a pusher-plate, to the underside of which are fixed two flat iron runners curved upwards at each end, so as to easily slide over any obstruction on the floor of the retort, such as uneven joints. The beam is raised and lowered by means of a lifting ram and cylinder secured vertically to the outside of the frame. Another cylinder and ram are also fixed to the framework for drawing in the pusher-rams after the completion of the outward stroke for the discharge of the coke. This is accomplished by means of a chain attached to the head of the pusher-plate and carried over pulleys to the withdrawing ram. On the outward stroke of the pusher-rams, the chain attached to the pusher-plate pulls in the withdrawing ram. On admitting pressure to the withdrawing ram, by its outward stroke it pulls in the pusher rams by the chain. Pressure for this purpose is admitted to the withdrawing cylinder automatically; and at a predetermined point of the outward stroke of the pusher the withdrawing ram-head engaging a tappet-rod connected by a lever to the distributing valve of a small actuating ram, the stroke of which, by suitable means, reverses the controlling valve, opens the exhaust port to the pusher cylinder and the pressure port to the withdrawing cylinder, and thus withdraws the pusher rams.

The great advantages of the discharger are simplicity of construction, reliability, and a minimum of wear and tear. The experience with the first machine was so satisfactory that a repeat order has been placed for another to be used in the middle house.

Carbonizing Results.

As the gas made by both systems is measured by the same meters, a comparison cannot be made of the results obtained at these works, from each separately; but by figures, for the months of June, July, and August, supplied from the Athol Street works, where there were inclines only, it is possible to make a very fair comparison between that system and the horizontals operated by a Fiddes-Aldridge machine at Linacre for the same period when this alone was working. Though the mixture of coals carbonized in each case was similar, it should be stated, in fairness to the inclines, that 10 per cent. of cannel was used with the horizontals.

	Inclines.	Horizontals F.A. Machine.
Gas made per ton	12,115 cubic feet	12,301 cubic feet
Illuminating power (tested in a batswing burner)	10·12 candles	14·61 candles
Tar made per ton	11·60 gallons	11·68 gallons
Ammoniacal liquor, 10 oz.	27 67 ,,	28·28 ,,

Working Costs.

In order to avoid any misunderstanding as to what is included in the costs given here, I have divided the items into three sections: (1) Unloading of the coal. (2) Labour in charging and discharging the retorts. (3) Removal and storage of the coke.

1.—Unloading of the Coal.

The coal for the S retort-houses is delivered by canal; and the cost includes all labour from boat to storage hoppers.

S House No. 2.

Coal handled per day, 258 tons.

	s.	d.
2 crane drivers at 5s.	10	0
4 trimmers in boat at 4s. 4d.	17	4
2 crusher men at 4s. 4d.	8	8
2 conveyor men at 4s. 4d.	8	8
2 overlookers (part time) at 4s. 10d.	7	6
	52	2

equals 2·4d. per ton.

S House No. 1.

The cost is the same as S House No. 2.

North Retort-House.

Here the coal is received by railway, and the cost includes the shunting, &c., as well as all labour charges from waggons to hoppers.

Coal handled per day, 237 tons.

	s.	d.
1 loco. driver at 5s.	5	0
1 shunter at 5s.	5	0
4 waggon men at 4s. 4d.	17	4
4 engine and elevator men at 5s.	20	0
	47	4

equals 2·4d. per ton.

It should be noted that the coal dealt with in Nos. 1 and 2 retort-houses, S works, has to be lifted up from the canal barges; while that in the North works is taken from waggons on the elevated railway.

2.—Costs of Charging and Discharging Retorts.

To make a fair comparison of each system, it is necessary that the above costs include the labour for charging and discharging the retorts only; the general retort-house work being omitted, as this cost is similar in each case.

	Horizontals. F.A. Machine.	Horizontals. A.F. Machine.	Inclines.
No. of retorts	174	156	64
Amount of charge	10¼ cwt.	10¼ cwt.	10¼ cwt.
Duration of charge	8 hours	8 hours	8 hours
Coal carbonized per 8-hour shift	86 tons	79 tons	32 tons
Men employed per shift	1 machine driver; 2 lid men	2 machine drivers; 2 lid men	2 chargers; 2 dischargers.
Cost per ton	2·1d.	3·0d.	6·5d.

In reviewing the above figures, it should be remembered that the inclined installation is small in comparison with the other two, and is thus somewhat handicapped.

3.—Removal and Storage of the Coke.

By Telpher Transporter. S House No. 2.

		s.	d.
Men employed per day	12 coke men at 5s.	60	0
	4 telpher men at 5s.	20	0
		80	0
Coal carbonized per day		258 tons.	
Cost per ton of coal		3·76d.	
,, ,, coke handled		6·76d.	

The cost of wheeling out the coke by barrow from the inclines and the North retort-house varies from 8d. to 1s. 6d. per ton, according to the distance wheeled and the height of stack.

When large quantities of coke are being stocked, an important advantage of the telpher is that the coke is carried at a high level, enabling it to be stacked at a great height without extra cost; whereas the stacking of coke to a similar height by hand labour involves wheeling-up, and is very expensive.

Discussion.

The discussion which followed the reading of the paper was very short; most of the questions likely to arise on the points dealt with having been put and answered in the course of the inspection of the plant earlier in the afternoon.

Mr. J. Alsop (Stockport) drew attention to the figures given in the paper as to costs of charging and discharging the retorts, and said he totally disagreed with them. With the horizontals and Fiddes-Aldridge machine, the cost per ton was given as 2·1d.; for horizontals and the Arrol-Foulis machine, 3·0d.; and for inclines, 6·5d. In face of these figures, there seemed to be a great advantage in favour of the horizontals as against inclines. He was quite aware there was a difference; but it was nothing like what was here shown by Mr. Astbury. He submitted that, had account been taken of machinery, maintenance, and wear and tear, it would have been found the difference between the two systems was not so great as the paper made it out to be.

Mr. A. Hodgson (Hurst) proposed a vote of thanks to Mr. Astbury for his paper, after remarking that, in going round the works, he had been particularly struck by the knowledge and acquaintance Mr. Astbury had with the plant and its details, appearing to have "everything at his fingers' ends."

Mr. R. H. Ginman (Birkenhead), who seconded the motion, had a question to put in regard to the ascension pipes in use for taking off the gas from the retorts. He had heard an engineer say that some scrap 4-inch pipes served quite as well as the 8-inch, because the latter got choked up and seldom had all the space clear.

The resolution having been put and carried,

Mr. Astbury replied. With regard to the point raised by Mr. Alsop, he said he understood that the question of the cost of the installation, the coal-handling plants, crushing plant, &c., had been dealt with by Mr. Gibson in the paper he read to the members of the Manchester Junior Gas Association in October, 1908. This was the reason they were not included in his paper that day. As to Mr. Ginman's question, it had been found that 8-inch pipes gave the best results. They were periodically examined and tested with a 6½-inch bell, conical in shape.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

A Monthly Meeting of the Western District of the Scottish Junior Gas Association was held in Glasgow on Saturday—the PRESIDENT (Mr. J. M'Ghee, of Glasgow) being in the chair.

MEDALS—OFFERED AND AWARDED.

The PRESIDENT intimated that Mr. J. W. Carmichael, of Barrhead, one of their honorary members, had offered a medal for the best paper of the session. He was sure they were pleased to see their honorary members coming forward so handsomely year after year. In regard to the medal for last year, the Selection Committee had decided to award it to Mr. George Scott, of Wall Street, for his paper on the "Repair of Gas-Meters;" and Mr. John Murray, of the drawing office, had been awarded the second prize for his paper on "Retort-Settings." The prize would consist of a book. With regard to the Coffee Meeting, he would like them to give it every consideration. It was not intended that the Press should be present; and what they had to do was to bring up any ideas or suggestions, and discuss them as they would do in the workshop. Any questions they wished to ask could be sent in to the Secretary a week before, or a short paper of 100 or 200 words might be read and discussed.

THE LATE MR. W. M. COWIE.

The PRESIDENT then made reference to the fact that since their last meeting one of their members who was on the syllabus had met a sad death in his bathroom, he understood through accidental suffocation—a very bright and promising young man, Mr. Cowie, of Lockerbie. He asked them to show their respect for the member who had passed away so suddenly by standing up; and the Secretary would express to his relatives that the members of the Association desired to express their sympathy with them in this hour.

PREPAYMENT METERS.

Mr. J. GRANT, of the Meter Department of the Glasgow Corporation, read a paper upon the above subject, in which he said: Having agreed to read a paper dealing with the subject of prepayment meters, I just wish to mention at the beginning that I am alive to the fact that it may prove rather difficult to command the attention and create the interest one would desire, when it is remembered that the prepayment meter is only an ordinary meter with a money attachment fitted on. Bearing this point in mind, and recalling the fact that two papers dealing more or less with ordinary meters have already been delivered before the Association, I feel, to a certain degree, confined and limited. At the same time, there is an abundance of matter to take up our attention for to-night, provided it is properly applied.

The prepayment meter has become so generally used that it would be a waste of time questioning whether it is a profitable investment or not. Personally speaking, I am convinced of the advisability of adopting this class of meter, and have more than one reason for advancing this statement. In the first instance, consider the number of consumers that have been added by the introduction of this meter. These persons previously utilized candles and paraffin oil lamps for lighting. We find them now using gas not only for lighting, but also for cooking and other household purposes. From a gas company's point of view, it is a sound investment to provide a new outlet for gas. For a moment or two we will view the matter from another standpoint, and from the consumer's side ask, firstly, What is to be gained by introducing the prepayment meter? We would without reserve answer: Improved lighting, labour saving, especially where paraffin oil has been used, due to cleaning glass chimneys and trimming wicks, also the marked absence of the disagreeable odour which is generally apparent under such circumstances; and the last, but by no means the least, reason for changing from the old conditions is because of the number of burning accidents that have been due to the use of paraffin oil, which unfortunately in many cases end fatally. I think after consideration of this point, no one will dispute the advisability of adopting the prepayment meter.

Should this class of meter be reserved for a certain section of the community? I am certainly not in favour of such a restriction. I am favourable to a more general adoption than has so far taken place, especially in large industrial centres, where a considerable proportion of the population are of the artizan class. In such districts, it must be apparent to all that there are great fluctuations of the labour market, due to times of prosperity and adversity. During a period of good trade and employment, assuredly everything is easy; but if the order of things is reversed in such districts, the pinch of poverty is felt, bills are overdue, and if consumers are supplied through an ordinary meter the gas bill will also be presented. If the consumer is unable to meet the bill, the supply is cut off but the debt remains. Even if afterwards the bill is paid, a further charge is made to have the supply renewed. Now let us suppose, under the same conditions, the consumer had the supply through a prepayment meter. In prosperous times, of course, no difficulty is experienced; but when the wheel of fortune is reversed, the prepayment meter assists the individual to economize, and no unpaid gas bill has to be faced afterwards. The question might reasonably be asked: Does it not become a temptation to such people to have a gas-meter in the house with money in the cash-box? I make bold to say that the gas company have nothing to fear from this quarter. From information which I believe to be authentic, these are not the people who break open the money-box of the meter. Who are the culprits? So far as Glasgow is concerned, I believe most of these burglaries are committed in houses where the tenants have removed. These people very often do not feel under any obligation to the department, and therefore seldom inform them of the change. I would suggest, in districts where consumers have a rebate or discount on the cash found in the box, that the gas company should retain a proportion of the amount until the sum of (say) 5s. is in hand. By doing so, I am of opinion that consumers removing to other premises would, without hesitation, report their intention to the department, knowing that failure to take this course meant financial loss to them.

Doubtless everyone present is fully aware of the fact that numbers of meters are damaged in the attempt to extract the cash from the box; and when one recognizes what is going on in this way, it is not to be wondered at if it is asked: What is being done to defeat the culprits who are such an annoyance to the gas department? We have before us to-night a few meters as supplied to the Glasgow Corporation. Some of these have been specially constructed to prevent loss in the manner indicated. The first I would direct your attention to is a meter with a reversible cash-box. The original was suggested by Mr. Alex. Wilson, Engineer and General Manager to the Glasgow Corporation Gas Department. This cash-box has been fitted so that the collector, after extracting the cash from the box, can replace it in the meter with the top looking out. If the tenant has removed, it will be quite apparent to any one that there is no money in the box; and therefore it would be of no avail to break other parts of the meter. Another type of improved cash-box is fitted to the "Metropolitan" meter now before you, and is made of very heavy sheet metal. A plate of similar material is attached to the gable of the meter, with a small slotted hole to receive the bolt of the lock. There are also two round pins to carry the cash-box. I may say this is an improvement on the meter manufacturer's own idea, which originally had a spring inside to be opened with a wire instead of a key. This alteration is also the result of Mr. Wilson's study of the matter. He suggested a small lock fitted into a pocket which could easily be renewed by simply unscrewing two small nails. When the box is fitted on the meter, only a small key hole in the front is perceived. This does away altogether with the hanging padlock and padlock hasp—these representing the parts which were most frequently attacked by the burglar. Another meter worthy of mention is from the firm of Messrs. R. Laidlaw and Son, of Edinburgh. It is made of malleable cast steel, and is very tough.

The Board of Trade, by Act of Parliament, demand that all meters shall be tested at 5-10ths pressure. To insure steady lights, it is necessary not to pack the stuffing-boxes too stiffly, or the meter will refuse to work smoothly and, of course, the lighting will not be satisfactory. When the meters go on the districts and the pressure in the main services is anything from 20-10ths to 40-10ths, it is not to be wondered at if some meters are found defective. I am of opinion that the time has arrived when the law pertaining to this matter should be amended. Gas-meters should be tested at a pressure more in harmony with the existing conditions.

After describing the mechanism of the ordinary meter, the author said the Glasgow Corporation Gas Department have the largest meter repairing department in the kingdom. Bearing this in mind, and also the fact that twenty-five different types of prepayment meters are dealt with, it will be readily admitted that the experience gained by repairing must be more valuable than being constantly engaged in building one type of meter. Glasgow has at present over 60,000 prepayment meters in use. This branch of the business has entirely developed during the past six years. It will be apparent to all, so far as the Gas Department are concerned, it affords an excellent outlet for gas. It may be interesting to note that during the last two-and-a-half years at our Walls Street workshops we have altered no less than 3000 ordinary meters to prepayment meters; a very large proportion of these being two-light. As far as we have gone, we have only dealt with one class of meter—viz., that of Messrs. R. Laidlaw and Son (Edinburgh), Limited. The result has been most gratifying. Every one of them has been fitted on the district, and there has not been one case under notice where we have had cause to complain of faulty workmanship. In many quarters the utility of such a step has often been questioned; but I say with every confidence that the action taken is not only profitable, but most prudent. In consequence of the large demand for prepayment meters, a great number of ordinary meters have been sent in from the district; thus leaving the department with a stock of meters for which there is no demand. What is to be done? We must either alter them or scrap them; and no gas manager can afford to take the latter course. Again, Why have we dealt mostly with the two-light meter? One important reason is that most of the people using the prepayment meter are small consumers; and we find the two-light large enough for the supply required. Another point I may mention is that in flats and tenement houses the gas-meter is placed in a confined corner, just where the fitter cannot find room to make the necessary connections. The two-light meter is found to be more suitable than the larger type would prove to be. The Glasgow Corporation have been most generous in the distribution of orders for prepayment meters; and among the firms fortunate in this respect I may mention R. Laidlaw and Son, J. Milne and Son, Metropolitan Gas Meters, Limited, Thomas Glover and Co.,

George Glover and Co., and Alder and Mackay. Several of these firms have also supplied different attachment for the meters.

Prepayment meters have all the same object—*i.e.*, the supply of gas payable in advance. The method of purchase is generally by placing a coin into the slot and turning a handle. There are, however, a few systems not quite the same as indicated. For instance, Metropolitan Gas-Meters, Limited, have a meter suitable for premises likely to be engaged for a short period of time. This type of meter has no cash-box. The conditions of purchase are as follows: The consumer desires a small quantity of gas, and by applying to the department and intimating the quantity likely to be required, an inspector calls (providing the meter is fitted), and, by means of a box-key which fits a spindle inside the meter, he enables the consumer to have a supply as agreed upon. Should a further quantity be desired, another application must be made to the department.

Another meter of peculiar construction, which I have no doubt a number of those present have seen, comes from the firm of George Wilson, of Coventry. One feature of note in this meter is the fact that no handle is required to turn on the quantity prepaid. In passing the coin through the slot, by its own weight the coin raises a small lever out of a check-wheel and causes it to revolve a given distance, thus opening the valve. The coin then drops into the money-box, and the lever again falls into position. In this meter another addition has been made—viz., if the consumer should place a smaller coin into the slot, and then turn the handle, the coin, instead of falling into the money-box, passes by another channel through the gable and back to the consumer again.

Prepayment meters of the more modern type are so simple with regard to the money attachment that I am not going to make more than a very few remarks on the construction of one or two different systems in vogue. The older patterns of (say) ten or twelve years ago were so complicated in action, and liable to get out of order, that I make the hazard that had it not been that the modern meter attachment is much improved and less complicated, it would certainly never have proved a profitable venture for gas companies to adopt the prepayment meter so generally as they have.

The first attachment that I want to bring under your notice is supplied by Messrs. Laidlaw and Son, of Edinburgh. It is a very strong and reliable attachment. It will be observed that the inlet of the meter is in a different position from that of the ordinary meter. The next meter is made by Metropolitan Gas-Meters, Limited, of Nottingham, and is advertised by them as the "Simplex Prepayment Meter," which is certainly an attractive as well as an appropriate designation. To any person who cares to examine it, the simplicity of the arrangement will be seen at a glance. There are about 25,000 of these meters in use in Glasgow; and from personal observation I consider it a splendid meter. It works well, and is easily repaired—two points of vital importance to any gas undertaking. Messrs. Alder and Mackay, of Edinburgh, have a splendid prepayment meter, strong and reliable. Numbers of this type are in use all over the kingdom; and the gas undertaking who have them need not waste time looking for a better one. Messrs. George Glover and Co., of London, have a meter which I also place in the first rank. It has a strong attachment, is simple in action, and is not easily put out of order. Messrs. James Milne and Son, of Edinburgh, have supplied a very large number of meters to Glasgow. This firm have a new pattern prepayment meter in hand at present. I will only draw your attention to one other type—a meter supplied by Messrs. Peebles and Co., of Edinburgh. It is quite up-to-date, not only to the members, but to those persons in daily touch with the meter department, whether they act in the capacity of inspectors, fitters, or repairers. Messrs. Peebles have described this meter as the "District Control Meter." It is one of the best arrangements I have ever seen, and reflects great credit on the patentee. The object of this invention is to enable the cash-box of the meter to be controlled in a more convenient and safe manner than up to the present has been generally possible. The position of the meter may be as at present, or it may even be put in places which would not now be desirable. It is intended to have the cash-box separate, and place it in a living-room (or where otherwise convenient), where it can be absolutely under the control of responsible parties. The pneumatic distance lighter, where the switch can be at a convenient corner of the room, has, say Messrs. Peebles, in most cases proved a great success; and by adapting this system to the prepayment meter, a similar advantage should be obtained.

Perhaps some of the members present will recollect the contents of a letter sent by me to the Editor of the "Journal of Gas Lighting" last February. It referred to the frequent changing of gas-meters in consumers' premises; ordinary meters being taken away and prepayment meters substituted, or *vice versâ*. I suggested that gas companies who were not disposed to the purchasing of ordinary meters and preferred the prepayment meter might be saved the trouble of exchange and the financial loss incurred thereby. The remedy I suggested was to fit prepayment meters in all places where there were frequent changes. Should the succeeding tenant wish an ordinary meter, instead of exchanging it would be advisable to put the prepayment change-wheel out of gear, and the same meter would do service as an ordinary type, as the valve would remain open. If a further change took place, the wheel could easily be brought into gear again. It is interesting to know these changes would not occupy more than a few seconds. I only refer to this letter so that I may give a practical demonstration of my point. Opinions may differ as to the advisability of adopting my suggestion, on the ground of expense. I consider the gain would be considerable, not only in labour saving, but the meters would not be damaged in removal.

Before closing my address, allow me a few minutes to deal with one or two faults commonly found in prepayment meters. I shall mention as the first complaint that gas is often reported by the inspector to be passing without coin. This is due to the valve not closing; and the reason could be attributed to many causes. The change-wheel or some other part may be out of gear or broken; or there may be some foreign matter on the valve. It should be understood that coins in the money-box will not be equivalent to pay for the gas consumed. The only way to recover the loss is to charge according to the ordinary meter index, as is done in Glasgow. The next fault I notice is very often the prepayment valve will not open. This is due perhaps to a weak spring, badly-fitted parts, or broken attachment. It may be the result of a bent coin, or someone tampering with the meter. After the meter is sent to the workshops, it may be found that the ordinary meter has broken down and the prepayment attachment is perfectly sound. Most of the complaints are due to the persistance of the burglars. It is, however, pleasing to know, as far as Glasgow is concerned, the amount of money extracted from prepayment meters is gradually decreasing (so our worthy President informs me).

One more important consideration is: How are we to get the best results in order to satisfy the consumer as well as the gas company? I should suggest that the consumers be advised not to work continually by the system of passing in one coin only and then using the gas until the valve closes. They should be educated to the principle of placing in several coins; and by this plan the gas will not be allowed to burn out entirely. The consumer would thus derive the full benefit of the amount purchased, and the gas company the great saving in the fact of the meters not being so severely strained.

In the workshops at Walls Street, we not only test our prepayment meters in the same manner as the ordinary, but we also test them to give the quantity promised for the coin inserted—*i.e.*, for 1d. we pass through 28 cubic feet of gas. In order to pass the quantity of gas through each individual meter would mean a serious loss to the Corporation, when one considers that about 200 meters are tested weekly—many of them requiring to be tested more than once, if not found accurate. It has been found very serviceable to have a supply of air from blast fanners which are propelled by a gas-engine in the fitting-shop. By this plan, a very large quantity of gas is saved. It may be of further interest for me to point out that, while Glasgow charges the prepayment consumer 7d. per 1000 cubic feet of gas more than the ordinary meter consumer, Edinburgh charges double this amount. On the other hand, we have a gas company near Glasgow who charge exactly one-half what we do. I quite admit this question is being discussed extensively at meetings of gas managers; but to my mind it is a local matter, and must be considered separately. Each manager knows his own particular district, and should be the best judge of the amount to fix as the charge.

Discussion.

Mr. W. Shepherd (Glasgow) expressed his belief that the prepayment attachment would prove a very profitable investment, especially to smaller companies; and when they considered that in some cases as many as 30 to 40 per cent. of the meters were changed in the city, they would prove profitable even in large companies. No doubt it would involve some few book-keeping changes; but this could not be insurmountable and would be a great saving. Mr. Grant had referred to the number of people who had been induced by the prepayment meter to leave off using paraffin oil for gas; but there must have also been a great number induced to transfer from the ordinary to the prepayment meter. The new pneumatic push attachment was quite interesting, and was sure to lend itself to the convenience of those using it. In Glasgow, they were much handicapped by the position of the meter. The interior fittings had also to be considered; and landlords were not very willing to alter their fittings to suit prepayment consumers.

Mr. F. L. M'Laren (Dumbarton) said his first introduction to a prepayment meter was about three weeks ago, when he visited a friend who was in lodgings. His friend said the only thing wrong was that the light went out every little while; and he (Mr. M'Laren) found out afterwards that they had a prepayment meter in the house. He thought the gas manager ought to arrange for the light not going out without warning; and he suggested a signal, such as the ringing of a bell.

Mr. W. Scott (Glasgow) said Mr. Grant's introductory remarks appealed to him very much. He agreed with him in the policy of further extending the giving out of these automatic meters. At May 31, 1905, there were in use in Glasgow 721 automatic meters; and at present they had over 61,000. This in itself was sufficient proof that the prepayment meter had come to stay. In London, they had three very large companies; and a big percentage of their meters were prepayment. He thought any company who followed the lead of London did well. They were not out to lose money, but to make it; and if they were losing money, they would soon drop the prepayment meter. Manchester and Liverpool were in the same case. It was a good thing that the prepayment meter had been introduced as a means whereby what

he might term improvident gas consumers might be under better conditions. What the gas company had to do was to protect these people from their own improvidence. Speaking of the breaking open of meters, he did not think strong meters were of very great advantage. His own experience was that the stronger the meter and the lock, the greater was the damage that was done. It might be asked what was the remedy; and he answered that it was quick survey. So long as they surveyed their meters at short periods, they would make it not worth the while of anybody to break into them. This point had been lost sight of by a great many companies. From his own experience, he stated that within the last year their arrears had gone down £100. This was sufficient to prove that quick surveying brought its own reward. For a time the improvements on the meters came so quickly one after the other that it was almost impossible to keep up with the work. But last year they surveyed about eight times in the year, with the result he had stated. Regarding the wireless telegraphing arrangement; he thought this also was a good thing. They had the meters in all sorts of high places in the houses; and if a prepayment meter came to be put in, it meant a great deal of trouble and inconvenience to the consumer to put in the penny. With regard to general arrears, he took the trouble some time ago to inquire into this matter between ordinary and prepayment meters. He took two streets which had been fully equipped about fifteen years before with ordinary meters where now prepayment meters were almost entirely used; and he found that the arrears on the ordinary meters were four times those on the prepayment meters. The class of consumers was the same. They were not of the wealthy class, but of the kind who were here to-day and away to-morrow.

Mr. GEORGE SCOTT (Walls Street) stated that he had the initial superintendence of the prepayment meters from 1895 to 1905, and he was able to cope with it himself; but it had now grown to such an extent that it took twenty men to look after the repairs on prepayment meters. Their experience at first was principally in combating people putting in a penny with a thread attached to it, so that they could pull it back again; but now the meters had been perfected, and it was quite a treat to look at the gear and its working. The meters came back to them as clean and neat as the little model that had been handed round.

The PRESIDENT said he considered they were gratified at having the pneumatic switch meter of Messrs. Peebles, and also Messrs. Milne's meter, with their new concentric attachment. In Glasgow, they were giving out prepayment meters more freely than they used to do. Formerly they only supplied them to houses of a certain rent; but now they were not too anxious to inquire into what the rental was, and they were being used at a greater rate than ever before. This did not mean that they were new consumers. In many cases they were displacing the ordinary meters. When they were getting three or four thousand ordinary meters returned for prepayment meters, they asked for prices for an attachment; and finally they got one from a maker fully 50 per cent. cheaper than any other quotation. They had found that even when they counted the cost of the men's time in fitting it up, it was working out at more than one-third less than the cost that a new prepayment meter would be. He would not put it in figures; but one of the leading gas managers would not listen to it, and said distinctly that it would be unprofitable to do so. He was pleased that they differed from him; and it had turned out a great success. Mr. Scott had referred to the clean insides of the meters when they were returned, as being a credit to the meter makers; but it was also a credit to the splendid gas they made in Glasgow. It was a good suggestion to retain 5s. as a guarantee for the gas being consumed; and it might induce the tenant to give them notice that he was going to remove. But he had a strong suspicion that in many cases the tenant did not inform them that he was going to remove until the box was emptied. He was also at one with Mr. Scott about the strength of the box. A thief might extract 5s.; but it might cost them 17s. or 18s. to repair the damage.

Mr. GRANT replied to the discussion, and received a vote of thanks for his paper.

REACTIONS OF THE OXIDES OF CARBON WITH SULPHUR COMPOUNDS.

A recent number of the "Berichte" of the German Chemical Society contained a paper by Messrs. Richard Meyer and S. Schuster on the reactions which occur under the influence of heat between carbonic acid and carbon bisulphide or sulphuretted hydrogen. Incidentally, also, reactions of carbonic oxide and those sulphur compounds, and of carbonic acid and sulphur dioxide are referred to. The following summary gives the chief points of practical significance in the paper.

It had previously been pointed out that carbonic oxide sometimes was present in the products of organic sulphur compounds when the latter were undergoing combustion in the laboratory for the determination of their composition. It had been found that when a mixture of carbonic acid and sulphur dioxide was passed over red-hot copper-wire spirals, small quantities of carbonic oxide were formed; and it was assumed that the carbonic oxide resulting from the combustion of organic sulphur compounds was similarly produced by the reduction of carbonic acid by the sulphur dioxide formed from the sulphur compounds. The authors have investigated this and other reactions between the oxides of carbon and sulphur compounds, both in the presence and in the absence of moisture, by passing the mixed gases or vapours at varying rates of flow through combustion tubing, sometimes empty and sometimes packed with catalytic materials, heated to a dull or bright red heat. In no conditions were they able to obtain more than trifling quantities of carbonic oxide from a mixture of carbonic acid and sulphur dioxide. But when carbonic acid mixed with dry vapour of carbon bisulphide was passed through the heated tube, carbon monoxide was obtained—the amount varying with the conditions and being highest when the temperature was high, the tube packed with platinized quartz, and the proportion of carbon bisulphide vapour in the mixture large. In one case, 40·7 per cent. of the carbonic acid was reduced to carbonic oxide, according to the equation: $CO_2 + CS_2 = 2CO + S_2$. This reaction is reversible; and the authors believe the formation of carbon oxysulphide may also occur from carbonic oxide and sulphur, according to the equation: $CO + S = COS$.

When the mixture of carbonic acid and carbon bisulphide was saturated at 175° to 185° Fahr. with water vapour before entering the red-hot combustion tube, carbonic oxide was formed equal in volume to about 5½ per cent. of the carbonic acid, together with a larger volume of sulphuretted hydrogen and some free sulphur. The probable reactions in this case are: (1) $CO_2 + CS_2 = 2\,CO + S_2$ [*vide supra*]; (2) $CO + S + H_2O = CO_2 + H_2S$. Both reactions are reversible, and probable subsidiary reactions are: (1) $CO + S = COS$ [*vide supra*]; (2) $H_2S = H_2 + S$. The authors infer that these equations represent the changes which occur from the fact that, in the absence of carbonic acid, the reaction does not take place.

When a mixture of about equal proportions of carbonic acid and sulphuretted hydrogen, in the absence of free hydrogen, was passed, after drying, through the heated combustion tube, carbonic oxide and hydrogen were produced—in greater proportion when the tube was packed with platinized quartz. The probable reactions in this case are: (1) $CO_2 + H_2S = CO + H_2O + S$; (2) $CO + H_2O = CO_2 + H_2$. Both reactions are reversible. That sulphuretted hydrogen has a direct reducing action on carbonic acid according to the first of these two equations rather than that sulphuretted hydrogen is first dissociated into sulphur and hydrogen, the latter of which might react with the carbonic acid according to the well-known water-gas equation ($CO_2 + H_2 = CO + H_2O$), was proved (1) by passing a mixture of carbonic acid and hydrogen through the tube, when very little carbonic oxide was formed, and (2) by passing sulphuretted hydrogen alone through the tube, when even though the latter was packed with platinized quartz, very little free hydrogen was formed by dissociation. On the other hand, when carbonic oxide and water vapour were passed through the red-hot tube packed with platinized quartz, the resultant gas contained about 10·5 per cent. of hydrogen, formed according to the reversal of the water-gas equation last quoted.

A dry mixture of equal proportions of carbonic oxide and sulphuretted hydrogen, free from carbonic acid and hydrogen, when passed through the heated tube, yielded a gas containing over 11 per cent. of hydrogen. The reaction is: $CO + H_2S = COS + H_2 = CO + S + H_2$. A mixture of carbonic oxide and sulphur vapour was converted completely into carbonic acid and carbon bisulphide, according to the equation: $2CO + S_2 = CO_2 + CS_2$. [The reverse of this reaction has already been referred to.] When a mixture of carbonic oxide, sulphur vapour, and water vapour was heated in the tube, carbonic acid equal in volume to 30·2 per cent. of the carbonic oxide was produced, together with sulphuretted hydrogen and a small quantity of hydrogen. The chief reaction is: $CO + H_2O + S = CO_2 + H_2S$. There is also the reaction: $CO + H_2O = CO_2 + H_2$ already referred to.

It therefore appears that the carbonic oxide previously observed among the products of combustion of organic sulphur compounds must have been formed by the action of carbon bisulphide or some other volatile organic sulphur compound on carbonic acid. Perhaps, also, the action between carbonic acid and sulphuretted hydrogen may have taken place to some extent. The reactions studied by the authors throw light on the changes which may take place between the sulphur compounds and the oxides of carbon and water vapour in crude coal gas, or partially purified gas which is heated.

The Smoke Abatement Exhibition in Manchester.—The recently formed Manchester and District Smoke Abatement Society will open its first exhibition next Friday, at the City Exhibition Hall in Liverpool Road, Deansgate, Manchester, for the purpose chiefly of demonstrating the possibilities of using gas and electricity in getting rid of the smoke evil. The exhibition, to which reference has already been made on several occasions in the "JOURNAL," will remain open until the 25th inst. It has been organized by Mr. Walter Cawood, of the City Exhibition Hall, assisted by an Advisory Committee, including the technical heads of the Manchester and Salford Gas, Electricity, and Sanitary Departments, with whom are associated a number of professional gentlemen whose services will help to make the venture a success. The Gas Committee of the Manchester Corporation have made arrangements by which their customers may visit the exhibition at half price on production of a printed slip sent them. A similar arrangement holds good for other gas undertakings.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Advertising.

SIR,—In the discussion upon the Publicity Scheme, several sympathizers with the movement have raised the question as to whether the sum suggested to be created for publicity work on behalf of the whole industry—namely, £25,000 a year—is not too great an amount to be expended upon such work.

Those who have entertained this doubt may be interested in the following extract from "Chambers's Journal" for November: "Messrs. Pears are credited with having spent £126,000 for advertising in one year, and altogether over £3,000,000 in making the merits of their soap known."

Is one-fifth of the amount spent in advertising soap too much for an industry to spend that has an invested capital of £130,000,000?

Those who have suggested that the publicity work should be started in a small way, and that, when "big results" have (in some mysterious way) been obtained, the industry as a whole could better be approached on the subject of spending a larger sum, may be asked to consider the remark made by an eminent American publicity expert, who said that the man who spent a small sum upon advertising and then complained that he could trace no results, reminded him of a man who lighted a match and held it under a big kettle and then complained that heat would not boil water. Put another way, "You can't drive a motor 'bus with a motor-cycle engine."

It is satisfactory to learn that the great majority of leading spirits in the gas industry have fully realized the fact that the sum asked for by the Publicity Committee—namely, 2s. 6d. per million cubic feet of gas made—is a minimum and not a maximum amount that can wisely be spent in pushing the interests of our great industry by means of co-operative advertising.

It is a matter of very great satisfaction to all interested in progressive methods to know that this question has advanced so far that the British Commercial Gas Association is an accomplished fact. It is to be hoped that it will only be a short time now before this organization gets actively to work and proves its value.

Now that the scheme has definitely been launched, we all confidently look forward to its receiving the support of every undertaking of any importance up and down the country.

PROGRESSIVE.

Oct. 31, 1911.

The Making of Gas-Fire Burners.

SIR,—In perusing the article on the above subject in the "JOURNAL" for the 24th ult., I was surprised at the great number of times the first person singular is used. The article favours the nature of an advertisement, for in the first part the writer says: "I believe I shall not in the long run suffer by making them public." Is a reward expected in the shape of business?

Your readers will agree with me when I say there are many firms who can produce a gas-fire equal in design, efficiency, and economy, and that it does not rest with any one firm to produce an up-to-date gas-fire.

It is not to be expected that Mr. Yates will give away the formula which he says he had gradually evolved. Nor will a firm like Messrs. Fletcher, Russell, and Co., Limited, give away the formula prepared by the late Mr. T. Fletcher many years ago. There are to-day many firms who make gas-burners other than by the rule-of-thumb.

Mr. Yates was not the first to drill out holes in burners to a standard size. They have been drilled out over twenty years ago, to my personal knowledge, true to the 1oooth part of an inch; and Mr. Fletcher, in a paper read before the Gas Institute in 1883, mentioned drilled burners in cast iron. The statement as to adding a little to the end of a burner without proportionately increasing other parts, is rather absurd. It might have been done when the writer was in infancy, but not in the present day, when gas-fires are made on scientific principles.

If the experiments with M. Méker's burners were not successful, why quote them? Is it an introduction to inform us that the fire yielded a lower percentage of radiation than with his own burner? The remarks that are made as to heat units I leave until a series of experiments can be carried out.

The statement amuses me: "The gas apparatus maker loses the just reward of his labours and skill." Bravo, Mr. Yates. The firm that I am closely connected with is one of the greatest sufferers on this point. The moment it places new designs on the market, they are at once seized upon and copied by some other makers.

Mr. Yates is struck with the great lack of knowledge still displayed in all makes of fires except his own. I should think that other firms are quite as able to place the back in a fire or design one.

The injector story is a good one. Perhaps it was told on the golf links when the ball was on the tee. The remarks as to adjusters and injectors are, in my opinion, directed only to one end, and I leave your readers to draw their own conclusions. Seeing he has purchased other makers' fires so as to test, &c., &c., it would be interesting to hear the results of the exhaustive tests made.

"The ideal nozzle is one which is adjustable so that its angle can be varied." Angle 160°. Is not this an advertisement? It is illustrated on p. 5 of his firm's catalogue.

Does he think that design and efficiency are attainable and are receiving attention only at the hands of the firm he represents? I should like to see his fire, which he poses as the perfect one, put in competition with other makers', the tests to be conducted by an independent person not in any way connected with a manufacturing firm. Then we should arrive at data and formulae that would be of benefit to the gas industry.

F. G. ROWSON.

Nov. 3, 1911.

[The letter of our correspondent is rather more personal in tone than we like to see in the "Correspondence" columns of the "JOURNAL" in connection with subjects of technical concern. But as Mr. Rowson signs his letter, the responsibility rests with him, and not partly with us as it would have done had he adopted a *nom de plume* or simply initials, and we had allowed the letter to be published. There is one point that does not appear to have struck Mr. Rowson. It is that Mr. Yates, in his article, did not make any universal indictment of other gas-fire manufacturers' productions. In a matter of this kind, we must be just. Mr. Yates supplied frankly, in the first paragraph, a motive for his article; and there is no occasion for him to write an article for the purpose of impressing the gas industry with the fact that he is associated with a certain Birmingham firm, nor with the fact that naturally Mr. Yates believes that his firm can make as good a fire as any other. The motive was simply this, that Mr. Yates finds mistrust of gas-fires still lingers, in a measure, in the public mind. Then he offers a suggestion for the correction of this. "One way in which this can be brought about is by *all* gas-fires being constructed not in empirical fashion, as *too many* still are to-day, but on principles arrived at as the result of scientific investigation." There is not a word there universally condemning other makers' goods. Commercial rivalry must not be allowed to unduly magnify words and actions.—ED. J.G.L.]

Mr. Adam Macpherson and the Kirkcaldy Gas-Works.

SIR,—I was much surprised to read in the "Notes from Scotland" in the "JOURNAL" for the 24th ult. of the doings at Kirkcaldy, and so, I am sure, will the gas profession generally be. If what is stated is the case, it is surely a hitherto unheard-of proceeding; and we shall anxiously look for the explanation asked for by your correspondent. If the intention was to disparage Mr. Macpherson, it will certainly entirely fail, as he will long be remembered in the gas profession as one of the ablest, most popular, and most highly respected of our Scottish engineers, whose name inscribed on any apparatus would be considered an honour in almost any gas-works.

SCOTTISH MANAGER.

Nov. 2, 1911.

Mr. E. W. Smith's Manchester Lecture Corrections.

SIR,—With reference to Mr. E. W. Smith's Manchester lecture and the corrections given in the "JOURNAL" for the 17th of October (p. 165), there are still some points not corrected. First of all, Unwin's formula should read—

$$Q = 1{,}323{,}250\sqrt{\frac{p_1^2 - p_2^2}{p_1^2}\left(\frac{p_1}{p_2}\right)^{\frac{2}{5}} \frac{d^5}{Sl}}\ .$$

Again, in Table VIII., column 4, fourth line, the capacity should be 574,570, and not 547,570.

HENRY O'CONNOR.

Edinburgh, Nov. 2, 1911.

Accident to a Gasholder at Lancaster.—During the gale which prevailed last Saturday night, a holder at the Lancaster Gas-Works was blown out of equilibrium, with resulting loss of a large volume of gas. Fortunately, little inconvenience was caused to householders, as there was sufficient gas in the other holder to meet all requirements.

Water-Gas Plant for Stourbridge.—Upon the recommendation of the Gas Committee, the Stourbridge Urban District Council have decided to spend £3000 upon a carburetted water-gas plant, which will, it is stated, add 25 per cent. to the manufacturing capacity of the gas-works. The tender of Messrs. Humphreys and Glasgow for the installation has been accepted.

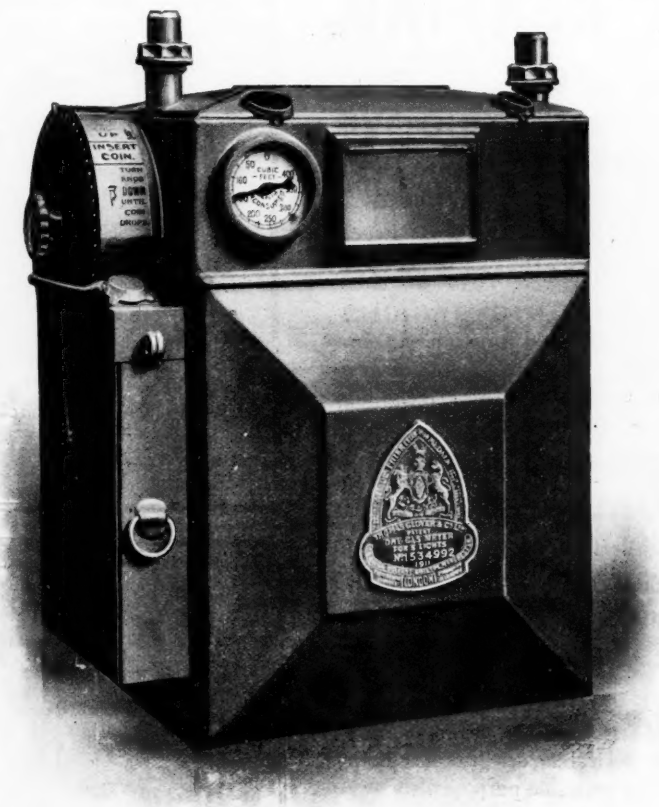
Sale of Shares.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards offered for sale, by order of the Directors, a new issue of 5 per cent. preference shares in the Woking District Gas Company, Limited. There were 1000 of them for disposal; and they were all sold at £5 1s. to £5 2s. 6d. each. On the same occasion, some fully-paid original £10 shares in the West Kent Gas Company, carrying 10 per cent. dividend, fetched £20 apiece; and some 5 per cent. ordinary stock of the South Essex Water Company, carrying the full dividend, from £118 10s. to £119 per £100.

Extension of New York Water-Works.—The scanty water supply of New York, which caused so much apprehension in the past summer, has led to the placing of a contract for connecting the new Catskill system with the old Croton works at once. The connection will consist of an extension of the blow-off of the Catskill aqueduct at Yorktown, in Westchester County, and will permit water to be turned directly into Croton Lake. This water will be furnished from the Esopus River by pumping until the Ashokan reservoir is in service. It is believed that in this way from 50 to 100 million gallons per day can be furnished to the city at the expense of pumping. The cost of connecting the two systems is about $41,600, on the basis of the contract just awarded for the work.

Penny-in-the-Slot Meter Dangers.—Dr. Wynn Westcott held an inquest at Shoreditch last Friday on the body of Albert Walker, aged 73, an old-age pensioner, who had been a cab-driver, and who resided at Sutton's Dwellings. A daughter-in-law stated that on Tuesday, as the old man did not come from his bed-room, the door was burst open, and he was found dead on the bed. There was a strong smell of gas. She explained that when he went to his room he always locked the door. There would be little gas in the penny-in-the-slot meter, and he would allow it to burn itself out. She put a penny into the meter, and later her husband also put in a coin. The result would be that gas had got into the room. Dr. H. G. Dixon said that death was due to poisoning by coal gas. As the dwellings were new, and the doors fitted well, the gas could not escape from the room as in old houses. A verdict of "Accidental Death" was returned. The Coroner said it was important that people should recognize the danger of not turning off the gas where penny-in-the-slot meters were used.

TO EVERY GAS UNDERTAKING

it is of the utmost importance that the Gas Meters used are accurate and durable. These essential qualities are to be found in the **THOMAS GLOVER METER,** which represents the high-water mark in Meter construction. Only the highest grade materials are used and the most skilful workmanship employed in their manufacture. This, together with the perfect mechanical design, the result of nearly three-quarters of a century's experience, makes



THE THOMAS GLOVER METER

the best and most reliable of all meters.

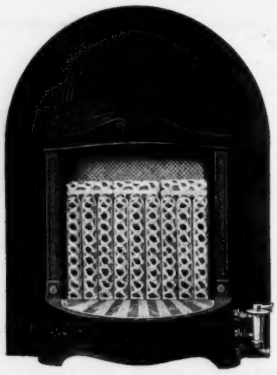
GUARANTEED FOR FIVE YEARS.

THOMAS GLOVER & CO., Ltd.,

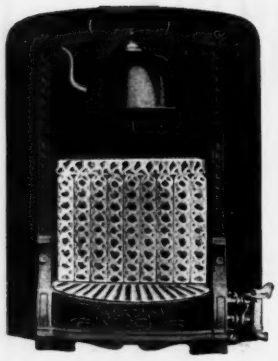
(Original Makers—Established 1844.)

GOTHIC WORKS, ANGEL ROAD, EDMONTON, LONDON, N.

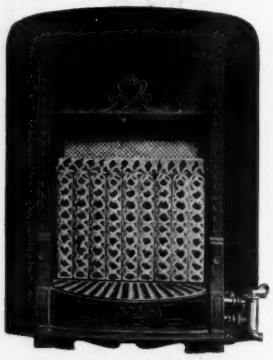
Gothic Ironworks, FALKIRK; 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 13, Whitworth Street West, MANCHESTER; 8, Exchange Place, Donegall Street, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY.



The "CARLTON."



The "SAVOY."
(With concealable boiling burner.)



The "SAVOY."
(Without boiling burner.)

"WILSON"
GAS HEATING.

SINCE our inception of the Gas Fire, **DISTINCTIVE FEATURES** of the greatest value in gas-heating have always marked the "WILSON" Fires from others.

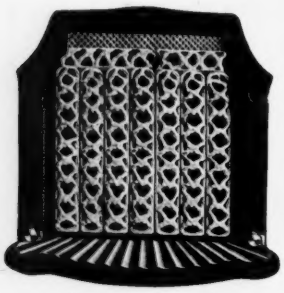
THIS SEASON'S DESIGNS worthily maintain the distinction and embrace valuable Patents and innovations only to be found in our Fires; including the

WILSON PATENTED NEW FUEL,
PATENTED REVERSIBLE DUPLEX BURNER AND TWO-WAY TAP,
PATENT CONCEALED BOILING BURNER
WILSON REFLECTOR FENDER,
BRAY'S SILENT GAS AND AIR ADJUSTERS,
&c.

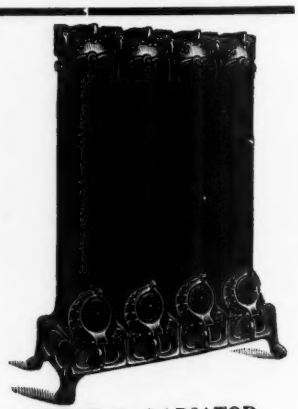
GAS ENGINEERS will find these to be the desirable designs for both hiring and sale purposes.

The "IDOL."
(Effective design in Eastern style.)

The "ELITE."
(Design which appeals to refined taste.)



"REGISTER-II."
(New pattern for fitting into stove grates.)



"REED" RADIATOR.
(For flueless heating, multiple columns.)

FULL DESCRIPTIVE LEAFLETS ON APPLICATION, AND ALL NEW FIRES READY FOR DESPATCH.

'REED" RADIATOR.
(For flueless heating, single column.)

FROM
WILSONS & MATHIESONS, LTD.,
CARLTON WORKS, ARMLEY, LEEDS.
London Show-rooms:
76, Queen Street, Cheapside, E.C.

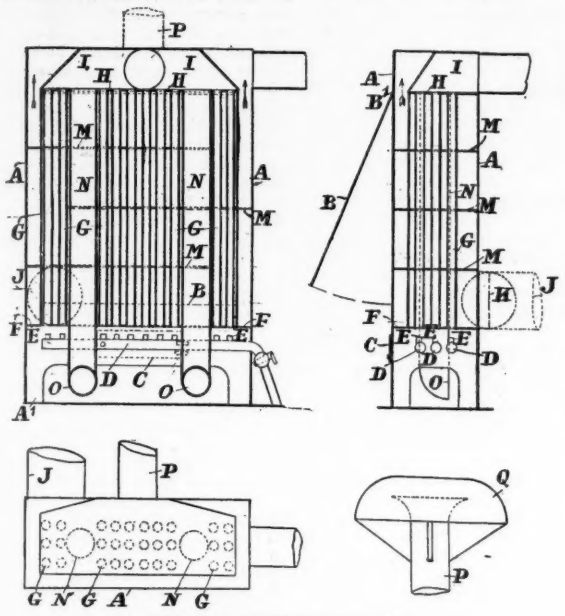
REGISTER OF PATENTS.

Heating and Ventilating Apparatus.

ILIFF, F., of Levenshulme, Manchester.

No. 20,164; Aug. 30, 1910.

This invention relates to heating and ventilating apparatus applicable more particularly to the class of apparatus arranged to deliver fresh heated air and to extract from a room or building foul air entering the apparatus near the floor level and discharge it outside the place.



Iliff's Gas Ventilating Apparatus.

The illustration shows one form of the apparatus adapted for use in dwelling-houses, offices, and the like.

The metal casing A is closed in front by a door B hinged for access to the interior. The lower part is also provided with a door C, hinged to give access to a chamber in which are pipes D (three are shown) branching from a gas-pipe controlled by a tap. The gas supplies a series of atmospheric burners E. Above the burners is a metallic division plate F extending right across the interior of the casing, and in it are a series of vertical pipes G, placed over the burners and extending upward to another metal plate H near the top of the casing. The gas-pipes are secured in the plates F and H, the latter of which forms the bottom of a collecting chamber I, which receives the hot air flowing upward into it through the vertical pipes G. To the casing near the bottom (but above the division-plate F) pipes J are connected (controlled by a damper K), which bring fresh air from the outside of the building into the interior of the casing. The air passes upward in a zig-zag direction, past a series of baffle-plates M, and escapes out of the openings at the top of the casing, past the collecting chamber I.

In addition to the vertical pipes G a number of vertical tubes N are employed (two being shown), which at the bottom are open, but are controlled by hinged dampers O, and at the top open into the collecting chamber I, from which a pipe outlet P is taken from the top or side (or from both if necessary) to any point of discharge either outside the building or to a chimney flue.

When the burners E are lighted, air to support combustion is admitted either through the door C or through perforations (not shown) in the bottom or sides of the casing; and the highly-heated products of combustion passing upwards through the vertical tubes G into the collecting chamber I heat up the whole interior of the casing, thereby warming the fresh air admitted through the pipe J, which passes through openings at the top of the casing into the interior of the room or building to be warmed. The warmed pure air, ascending to the top of the room, drives down the noxious air, which passes upward through the heated tubes N and is discharged through the outlet pipe P—the action being assisted, if necessary by a fan. To prevent down draught, the external end of the discharge pipe P may be covered with a cowl.

A modified construction is illustrated in the specification; but it is substantially the same in principle, and in its method of operation, as that already described. The only material points of difference in construction are that the casing A is circular and the baffle-plates M are arranged in a spiral.

Incandescent Gas-Burners.

PROSSER, H. R., of King's Heath, Worcestershire.

No. 22,533; Sept. 29, 1910.

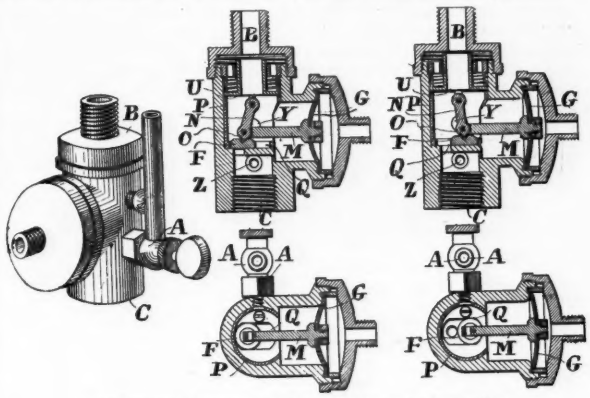
This invention has for its object to render the bye-pass of an incandescent gas-burner more efficient as a producer of light by causing the outer cone of the flame to take a direction more or less along the surface of the mantle instead of impinging on it at right angles. The invention provides that the jet from which the gas issues faces sideways instead of upwardly; and, in addition to the increased light thus obtained, the inventor claims the "further advantage that, by virtue of the gas-jet being arranged at the side, it cannot very readily become stopped or closed by soot or other foreign matter resulting from the combustion."

Pneumatic Control Devices for Gas.

SPERRYN, G. N., of Handsworth, and BARRETT, S. R., of King's Heath, Birmingham.

No. 23,039; Oct. 5, 1910.

This invention relates to pneumatic control devices used on gas-lighting systems for enabling switching on and off from a distance. The actuation of the valve is effected through a rod and pendulous rod system—the pendulous rod directly engaging the valve. Resilient pressure is applied to the valve through the rod. The pressure on the valve has not directly to be overcome by the operating means in either opening or closing, but is constant upon the valve in either position.



Sperryn and Barrett's Pneumatic Burner-Controller.

The illustration shows a perspective view of the valve for use with an upright burner; also a central vertical and transverse section with the valve in the closed and open position respectively.

The controller is formed with an internal wall prepared so as to provide a suitable surface for the operation of a sliding valve F, which is operated through connections by the motion of a diaphragm G in a small chamber formed with a domed enclosing cap, which is provided with means for connecting up the diaphragm chamber with an air-pipe leading to a switch (to which the present invention does not relate). Movements of air in the pipe system connected to the diaphragm chamber cause a movement of the diaphragm when air is forced toward it and when air is drawn away from it.

The connection between the diaphragm and the valve F comprises a rod M directly connected to the diaphragm and a pendulous rod N, to the lower end of which the rod M is jointed. The pendulous rod engages the valve by means of a nib O. There is a sleeve P (inside the controller) which is closed at the bottom, and a slot Q is formed in it which guides the movements of the valve. The sleeve P is provided with notches in the top, in which the cross-bar of the pendulous rod is engaged.

It is necessary to allow a little movement of the bearing of the pendulous rod; and it is preferable to press the valve F into its seat, to ensure effective closure of the gas-passage. To this end, there is a cap U for closing the top of the sleeve with lugs, for projecting into the notches in the sleeve and bearing on the trunnions, and upon the cap is a spring, which bears against a screwed washer and presses down the cap U to exert a resilient pressure through the pendulous rod on to the valve. This resilient pressure allows the pendulous rod the necessary movement in its bearings, while mounting the valve on its seat.

It is preferred to form two openings Y Z in the body of the controller for the connection of the bye-pass. Y is above the gas aperture and Z is below; and one is closed by a screw plug when the other is in use. For an upright burner, Z is used for the connection of the bye-pass; for an inverted fitting, Y must be used. For an upright burner fitting, the connections B C are respectively a threaded spigot at the top and a threaded socket at the bottom; but for an inverted burner fitting the reverse is the case.

Recovery of Bye-Products from Tar.

MOORE, W. G., of Birmingham.

No. 23,376; Oct. 10, 1910.

This invention relates to a modification of Burstall's patent No. 18,148 of 1910, in which is described a process of treating carbonaceous substances (such as coal) for the production of fuel, and according to which the substances are subjected to a combined high temperature and reduced pressure by being placed in a retort having air-tight doors and in which a temperature of from 850° to 1000° C. is maintained in combination with a pressure of 10 to 18 inches of mercury below the atmospheric pressure. The object of the improvements is the recovery from the tar of a large percentage of oily compounds which are highly inflammable, and various of which have a specific gravity greater than water.

According to the present invention, the tarry or oily bye-products are subjected to distillation by being placed in a still; and the vapours condense into the oily compounds referred to, which latter constitute about 40 to 45 per cent. by weight of the original contents of the still. The distillation may be carried on fractionally, at gradually increasing temperatures—from 90° to 600° Fahr. or higher. Thus when all the vapours have been secured at a particular temperature, the distillate is removed; the temperature increased; and the new distillate collected. The residue in the retort may be described as "a black substance similar to wax or bitumen, which when held in a bunsen flame burns slowly and with very little smoke."

The patentee states that he also finds that, in condensing the vapours,

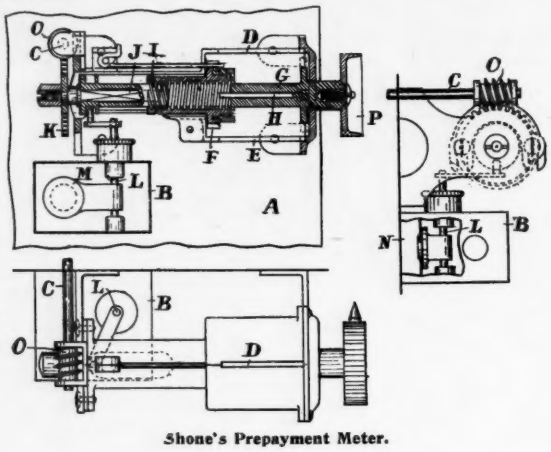
various of the distillates comprise or contain a plurality of compounds or products which automatically separate from each other by gravity, and are clearly defined in colour; the one floating on the surface of the other in the condenser. At or about the completion of the fractional distillation there is also collected a small percentage of a heavy substance, light brown in colour, and of thick and sticky consistency. The first distillates of the bye-products may be broken up into further compounds on reheating and distilling.

Prepayment Mechanism for Meters.

SHONE, G., of Liverpool.

No. 27,810; Nov. 30, 1910.

This invention relates to coin-freed prepayment mechanism (particularly applicable to fluid meters), in which the reciprocating axial motion of the screw actuates to open a valve through the medium of a coin and handle, and to close it through the operation of the delivery mechanism.



Shone's Prepayment Meter.

The illustration represents the mechanism in sectional elevation, in plan, and in end elevation.

A is the casing of the meter, B the valve, and C the spindle for closing the valve when the volume equivalent to the coin inserted has been delivered. The spindle is usually geared to, and driven by, the valve spindle of the meter, which in dry meters is rotated by the flag rods of the measuring chambers, through arms and links, and in wet meters by the drum spindle through a vertical shaft and worm gearing.

The mechanism is enclosed in a casing conveniently made in two parts, divided longitudinally. The ends of the casing are recessed into standards and fixed thereto by screws. In the top of the casing is a slot D, for the insertion of the coins, and a corresponding one E in the bottom to drop into the coin-box (not shown). In the casing is mounted a sleeve nut with a square thread. On the outside of the nut is formed a collar having notches F into which engages a spring finger fixed between the ears formed on the casing by which the two parts of it are fixed together. The notches have one sloping side, which enables the nut to be turned round in one direction, but prevents its moving in the opposite direction when the finger is engaged in a notch. The nut is loosely mounted in the casing so as to turn easily in it.

In the enlarged end of the casing is mounted a slotted body G, for receiving the coin and employing it as the medium for transmitting the motion of the handle for actuating the valve. The coin-pocket H is long enough to receive a coin of any prescribed value; but the coin is prevented at the bottom side from falling through owing to the slot being shorter. In the illustration, the body G is shown turned a quarter of a revolution with the slot H at right angles to the slots D and E.

The screw I has a preferably square hole through it, and an annular groove formed in a collar. A spindle J, of square cross section for a portion of its length, loosely fits the square hole, thus enabling the screw to slide on the spindle. The outer end of the spindle makes a bearing in the small end of the case, and carries at its end a worm or gear-wheel K, which is made easily detachable by means of a screwed end and nut. In the groove of the collar engages a pin fixed to a crank on the valve spindle L.

The valve M is of the usual gate-type used in automatic meters. The inlet chamber to be connected with the gas-main is represented by N, the valve-box B having an opening (not shown) leading to the measuring chambers. On the spindle C is fixed a worm O, which engages with the worm-wheel K. This worm is mounted in a bracket, which is vertically adjustable by means of slots and screws so as to enable the wheel K to be changed and the ratio of the gear varied to give a greater or less volume of gas for a single coin.

Owing to there being four notches F in the nut, if the handle P is turned a shade over a quarter of a revolution the finger working in the notches F prevents it being turned back, and the coin, which will not have dropped out of the pocket, cannot be removed until a half turn of the handle is made, when it will fall through the lower slot E into the coin-box.

Each turn of the handle in one direction (a coin being inserted when the pointer is at the top) will cause the screw I to be drawn into the nut, and a limited number of coins only can be consecutively inserted at one time as the transverse of the screw is limited. Each coin therefore causes the valve to open through the lever and collar a definite distance; and the aggregate of such distances necessitates a certain number of revolutions of the worm O, driven by the measuring chambers, to close the valve again.

Quenching the Product of Coke-Ovens or Gas-Retorts.

JONES, A. O., of Whitley Bay, Northumberland.

No. 28,662; Dec. 9, 1910.

It is common practice at the present time, the patentee points out, to quench the coke product obtained from vertical or horizontal coking-ovens or gas-retorts, after the removal of the coke from the retorts and in the open air, by subjecting the coke to a drenching action by jets of water thrown upon it. But he considers that a brighter and better commercial product would be produced if the coke could be quenched in a closed chamber and without the free access of air. Such a process has, however, not hitherto been practicable in cases where the coked product has to be removed from the oven before quenching, as is the case with coke-ovens or gas-retorts of the type referred to. The object therefore of the present invention is to provide means whereby the required result can be attained.

He provides what he terms a quenching chamber adjacent to the ovens or retorts, constructed of brickwork or other suitable material, and formed with openings through which the mass of the coked product, as withdrawn, can be immediately transferred to within the quenching chamber. The openings are fitted with doors or similar means of closure, so that, upon the introduction of the coked mass into the chamber, the doors are closed and the air thereby excluded or partially excluded.

The quenching chamber is fitted with water-conducting channels extending through its walls, and is also constructed with air exit apertures, and generally with a suitable drainage to take away the water from the interior of the chamber.

The coke to be quenched having been placed within the chamber and the doors closed, water is admitted through the water-channels so that the jets impinge upon the coked mass. The steam produced causes the air to pass out of the chamber by the air exit apertures; and thus it is feasible to quench the coke while the air is excluded, or in great part excluded, and thus a brighter and better product is the result.

The invention is particularly applicable for use where the coked product from an oven is delivered direct into a waggon or wheeled conveyor. In such a case, the quenching chamber is made somewhat in the form of a tunnel through which the wheel track extends, so that the waggon or conveyor can be run directly into the chamber. Having been so placed, the doors (which are fitted at the ends of the tunnel-like chamber) are closed and the water admitted to the coke, while the air passes out through apertures at the base of the tunnel.

Inverted Incandescent Gas-Lamps.

WILLIAM SUGG AND CO., LIMITED, and MATTOCK, W. G. H., of Regency Street, Westminster.

No. 28,676; Dec. 9, 1910.

According to this invention, the lantern is fitted with an annular gas-chamber encircling it—preferably effected by making the middle portion of the lantern of a casting, which contains the annular gas-chamber. It forms also a support for the rest of the lantern and the burners, and constitutes a means for attaching the lantern to the column below.

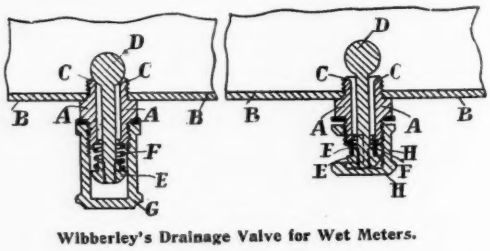
A general description of the lantern appeared in the "JOURNAL" for Sept. 26, p. 806.

Drainage Valves for Wet Gas-Meters.

WIBBERLEY, R., of Derby.

No. 29,009; Dec. 14, 1910.

This invention relates to a spring-controlled valve for letting-out water from wet gas-meters, in place of the ordinary "bottom screw."



Wibberley's Drainage Valve for Wet Meters.

The valve-box A is fixed near the bottom of the meter B; the valve seating C being inside the meter. The valve itself is of globular or curved shape D where it fits on the seating. The stem passes downwards through and out at the bottom of the case and terminates in an annularly projecting flange E, between which and the end of the casing is arranged a spring F, tending normally to keep the valve tightly down to its seating as first shown. A screw-cap G covers the outer end of the valve-stem, or the like, and the spring.

When it is desired to empty water out of the meter, it is only necessary to unscrew the cap G and push up the valve-stem, the lower end of which is suitably formed for the purpose. Immediately the water ceases to flow, the gas comes through the valve; the stem of the latter is released; and the spring returns it to its seating and the screw-cap is replaced. To prevent waste of time while the water is running out, a shorter cap H may be used for operating the valve-stem. This is screwed on in the position of the cap G until its head bears against the mushroom head E of the valve-stem and opens the valve.

Carburetted Water Gas Manufacture.

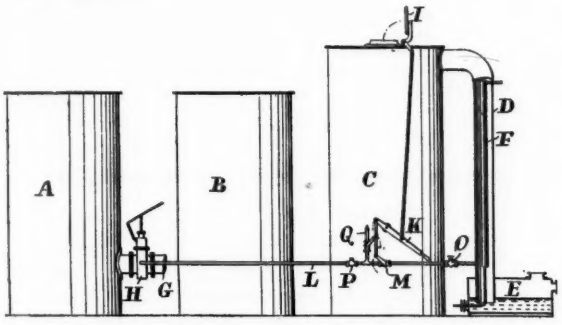
CARROLL, L. D., of 38, Victoria Street, S.W.

No. 28,763; Dec. 10, 1910.

This invention relates to the preheating of oil for carburetted water-gas manufacture. In patent No. 6324 of 1893, there was described an oil-heater situated in the gas-conduit between the fixing-chambers and the washer-seal, and heated by the sensible heat of the hot newly-made carburetted water gas issuing from the fixing-chambers before the gas has been cleaned and cooled by contact with the water in the washer-seal.

This oil-heater has been, and is still, extensively used, the patentee points out; but it has not proved wholly satisfactory for the following reasons: First, the oil is heated only during the period of gas-making, and cools during the period of blasting; and secondly, the heater, although efficient when new and clean, soon has its heating surface fouled with carbonaceous matter deposited by the crude carburetted water gas, and becomes ineffective. To overcome this latter difficulty, oil-heaters in many cases have been placed in the outlet-conduit from the washer-seal; but, as the temperature of the partially-cleaned gas at this point is below 200° Fahr., heaters so located are useless.

As a broad result of the above difficulties, the preheating of oil for carburetted water-gas manufacture has been largely abandoned. Nevertheless, the gradual accumulation of the carbonaceous deposit in the gas-conduit necessitates periodical stoppage and cleaning; and the patentee has recently found that this deposit can be burned and its accumulation prevented by introducing a regulated supply of air into the bottom of the gas-conduit when at its ordinary working temperature. By careful experiment, he has discovered that carbonaceous matter deposited during the gas-making period upon an oil-heater within this conduit can be safely, regularly, and automatically burned during the blast period in such a manner as not only to keep the oil-heater in clean and efficient condition, but also to utilize this otherwise objectionable deposit to continue the interrupted preheating of the oil throughout the blast period. Thus the oil in the heater will be at the proper temperature at the beginning of each period of gas-making, and the almost prohibitive difficulties hitherto attaching to oil heating are effectively overcome.



Carroll's Oil-Preheater for Water-Gas Plant.

The diagram illustrates a carburetted water-gas apparatus embodying this invention.

A is the gas-generating chamber, B the carburetting-chamber, and C the fixing-chamber—all provided with the usual connections (not shown). D is the gas-conduit from the fixing-chamber to the washer-seal E; and F is the oil-heater, of any suitable type. G is the air-blast pipe fitted at H with a double disc-valve; and I is the stack-valve, operated by a lever K. L is a pipe connecting the space between the discs of the air-blast valve with the lower part of the conduit D. It is fitted with a valve M coupled with the lever K, so that the valves I and M open and close together. O is a regulating stop valve.

With such an arrangement, when the valves H and I are open for blasting, the valve M is also open; and air under pressure passes at a rate regulated by the valve O into the conduit D, where it causes combustion of the hot carbonaceous deposit which continues the heating of the oil. The products of combustion escape through the stack-valve; and the combustion of the deposit prevents its accumulation and keeps the oil-heater clean and efficient.

As the valve H is closed during the gas-making period, by connecting the pipe L to the space between the discs of the valve H, air would be prevented from flowing into the conduit D during gas-making, even if, as through any mishap to its connections, the valve M should not then be closed. Furthermore, there is fitted in the pipe L a non-return valve P, so that gas from the conduit D cannot pass back through the pipe L to the valve H. As additional protection, a vent-pipe Q is attached to the pipe L between the valves M and P, through which vent-pipe gas will escape in view of the operator if the valve M is not closed during gas-making. To avoid waste of air, the vent-pipe is fitted with a valve coupled so as to close when the valve M is opened.

Manufacturing Ammonium Sulphate.

COLLETT, E., and ECKARDT, M., of Christiania, Norway.

No. 29,386; Dec. 17, 1910. Date claimed under International Convention, Dec. 20, 1909.

When ammonia is caused to react upon a mixture of sulphuric and sulphurous acids, the patentees mention, a mixture of sulphate and sulphite of ammonia is obtained; and it is a problem of great importance commercially to entirely convert this mixture into sulphate. This may be effected by treating the mixture with sulphuric acid, when the sulphurous acid present as sulphite in the mixture will be driven out and be replaced by sulphuric acid. Such treatment with sulphuric acid is, however, expensive, "on account of the relatively high cost of production of the sulphuric acid."

According to the present invention, it is possible, they say, to avoid this high cost in the manner here described: In the combustion of a sulphur-bearing compound (like iron pyrites), the combustion or oxidation of the sulphur may be carried out in such a manner as to obtain the ratio of the amounts of sulphurous anhydride and sulphuric anhydride present in the gaseous products of combustion within certain limits more or less as desired. The gaseous mixture thus obtained is "far cheaper to manufacture per unit weight of sulphur than is sulphuric acid." According to the present invention, a mixture of ammonium sulphate and sulphite is treated with the mixture of gases containing sulphurous anhydride and sulphuric anhydride; and it is found that the whole of the mixture of salts is after a time converted into ammonium sulphate. It is said to be particularly advantageous during the reaction to add some oxygen—the progress of the reaction being thereby facilitated.

The patentees say they are aware that it has been previously proposed to treat minerals or ores in suspension with a gas containing sulphurous acid and air under pressure, for the purpose of sulphatizing the minerals, also to remove sulphuric anhydride from gases obtained by the combustion of sulphide ores (such as iron pyrites) by washing the gases with water containing sodium bisulphite or similar chemicals previous to treating the gases by the contact process for the production of sulphuric anhydride.

Ensuring a Steady Flow to Automatic Gas-Analysis Recorders.

SIMPSON, D. H., of Collingham Bridge, near Leeds.

No. 468; Jan. 7, 1911.

With a view to the continuous analysis of flue and other gases, the patentee proposes that the recorder employed, in addition to being attached to the flue from which the gas is drawn to be analyzed, be connected up to pumping apparatus, consisting of a closed casing containing water or other sealing liquid to a given level, and which is fitted with a revoluble drum (formed with pockets or gas-chambers) immersed so that its upper part only is above the water or other sealing liquid, while the casing is fitted with an outlet pipe whose upper end is within the drum above the water level. The drum is rotated in its casing at a given speed in any convenient manner; and as the drum is revolved, the gas-chambers formed in it have the effect of first drawing in the gas by way of the recorder and then expelling it by way of the outlet pipe in the casing. Thus a regular or steady flow of gas to the recorder from the flue is ensured.

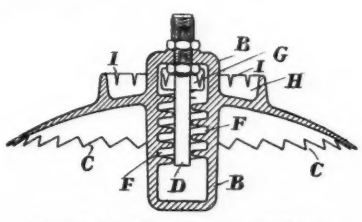
A form of pumping apparatus found to answer well consists of a closed casing, containing water or other sealing liquid up to a given level, fitted with a pumping-drum formed with a series of gas-chambers, and being fixed on a revoluble shaft geared by suitable gear-wheels to another revoluble shaft, upon which is fixed a water-wheel situated within a second vessel or casing adjacent to the drum casing. The recorder is connected by a pipe to the drum casing; and the latter is provided with an outlet pipe having its upper end exposed above the level of the water-seal on the inside of the drum, while the water-wheel casing is fitted with a receiver tank into which water is fed (say) from the usual water-discharge pipe of the recorder. The tank is provided with a nozzle by way of which the water passes to the water-wheel.

Sprinklers for Scrubbers.

MOORE, W. H., and AMBROSE SHARDLOW AND CO., LIMITED, of Sheffield.

No. 13,193; June 1, 1911.

This invention relates to means for distributing water as evenly as possible on the upper surface of a column of coke or other substance to be kept cool and moist by water trickling through it, and also to prevent the efficiency of the sprinkler from deteriorating after it has been at work for some time.



Moore's Sprinkler for Gas Scrubbers.

The sprinkler or distributer proposed is made in the form of a dome with a hollow boss B in the centre, and with indentations C arranged all round the edge. Through an orifice in the top of the boss is passed the feed-pipe D, leading from the upper part of the scrubber. The sprinkler is suspended from this pipe, and is fixed to it by means of lock nuts above and below the top end of the boss B, which is made with a helix or thread F cast on the inside—the helix being of any convenient size and pitch. The end of the pipe D is passed down the centre of the boss to within a certain distance from the bottom—the sides of the pipe just clearing the tips of the helix. The object of this construction is to prevent the splashing of water taking place, as this "would be detrimental to an even distribution."

When the water has left the feed-pipe D, it is prevented by the helix F from gushing upwards, and is led steadily along the annular passage between the helix and the pipe. The water is eventually

delivered through the openings G in the upper part of the boss into a circular basin or tray H, around the edges of which are notches I, arranged at suitable distances apart, and connected to the indentations by grooves formed in the surface of the sprinkler.

Distilling Tar.

WEIL, J. A., of Stockton-on-Tees.

No. 8007; March 30, 1911.

There is, says the patentee, considerable difficulty in distilling tar condensed from producer gas, "due to the fact that such tar contains a large proportion of water so emulsified with the tar that no mechanical method of separation has succeeded, and that separation by boiling a large bulk in an ordinary form of still is attended by grave difficulties such as frothing." He finds that the best mode of heating such tar is to cause it to flow in a substantially helical path over the inner surface of an externally heated vacuum still—a mode of heating which has been suggested for tar-stills. The cylindrical form of still having a helical shelf or guide on its inner surface is, however, ill-adapted to the distillation of tar containing so much water as is present in most producer gas tars.

Accordingly he has constructed a still of a downwardly coned shape and the shelf or guide as a shallow V-shaped trough. In this manner he obtains a uniform or slightly accelerating flow of the tar, which greatly decreases in bulk owing mainly to loss of water as it descends the still.

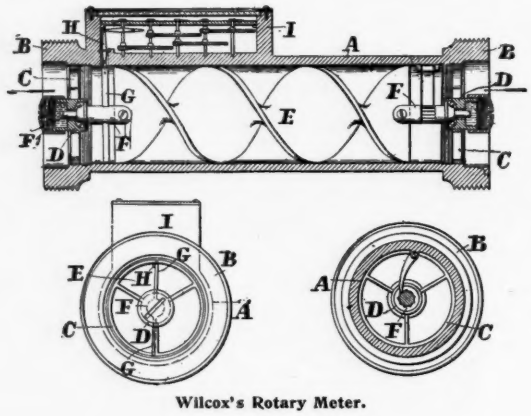
The claims made for the inventions are: (1) A still for the continuous distillation of crude producer gas tar of the kind in which the tar flows down a helical shaft or guide in contact with the inner surface of the still constructed of downwardly coned shape and having a shallow V-shaped helical trough on its inner surface. (2) A plant for the continuous distillation of crude tar containing much water, comprising (*a*) a settling tank in which the tar is kept hot; (*b*) a still constructed as referred to in claim 1, whereinto the tar flows, or is sucked continuously, from the tank; (*c*) a closed tank into which the pitch flows from the bottom of the tank; (*d*) a condenser; (*e*) a water and oil separator, wherein the condensate is collected; (*f*) a water-receiver and an oil-receiver connected respectively with the separator by pipes having cocks; and (*g*) a vacuum pump adapted to maintain a diminished pressure in the whole apparatus.

Rotary Meters.

WILCOX, W. L., of Cleveland, Ohio, U.S.A.

No. 13,646; June 7, 1911.

This invention relates to rotary fluid-meters having a spiral blade mounted in a cylindrical casing and supported by anti-friction bearings, with a registering device actuated by the movements of the spiral blade.



Wilcox's Rotary Meter.

A vertical section of the meter is shown; also an end view and a transverse sectional view.

A section of brass tubing A has a collar B at each end, externally threaded for connection with the gas main or pipe. The collar is also internally threaded to receive a ring C, which carries a bearing D by means of spider arms—three in number; "thus permitting a ready flow of gas through the meter." E is a spiral, preferably constructed of aluminium, and of such external diameter as to fit snugly within the tube A and turn freely therein. The spiral is supported at each end by shafts F, rigidly fastened to the opposite ends of the spiral and having their reduced ends journalled in the bearings D, with anti-friction balls arranged therein to reduce friction to a minimum.

One of the shafts F is provided with a ratchet adapted to be engaged by a depending pivoted pawl to prevent the spiral rotating in the reverse direction. Upon the opposite shaft F are arranged arms G, of such length as to engage the depending portion of the star-wheel H, constituting part of the registering mechanism. This mechanism is arranged in a case I, formed upon the top of the tube A; and the star-wheel transmits motion to its neighbouring wheel, and in this manner the entire registering system is operated.

The gas passes through the meter in the direction of the arrow; and, in so doing, it rotates the spiral, and this, in turn, operates the arms G, which contact with the star-wheel H, and operate the register. By reducing the number of parts to a minimum and arranging the shafts upon lubricated ball-bearings, the friction is reduced to a minimum, and at the same time all the parts are protected against dirt and other foreign matter which would ordinarily impair the meter.

APPLICATIONS FOR LETTERS PATENT.

23,321.—OLSO-LICHT-GES. HALBMAYR AND CO., "Gas lighting and heating apparatus." Oct. 23.

23,420.—SIMPSON, F., and WOODS, A. R. T., "Fluid-flow meters." Oct. 24.

23,447.—FEARON, J. A., "Purifying or desulphurizing hydrocarbon gases." Oct. 24.

23,448.—FEARON, J. A., "Retort." Oct. 24.

23,452.—LITTLE, C. R., "Radiators for gas-burners." Oct. 24.

23,487.—PHILLIPS, C. W., "Compressing gas." A communication from A. C. Rossler. Oct. 24.

23,491.—BAPTISTE, F., "Pipe-joints." Oct. 24.

23,501.—HUMÁRAN, F. G., "Production of explosive gas mixtures." Oct. 24.

23,555.—HIPKISS, H., AND CO., LTD., and PICKEN, H. H., "Upright incandescent burner." Oct. 25.

23,568.—CHANDLER, S., and WALLER, B. B., "Treating gas when at high and low temperatures." Oct. 25.

23,592.—MASCHINENFABRIK SÜRTH GES. M. B. H., and VOLLAND, E., "Extracting carbonic acid from the exhaust gases of a gas-engine." Oct. 25.

23,679.—WOODROFFE, F. K., and BOULTBEE, H. W., "Measuring and recording the quantity of liquids passing through orifices." Oct. 26.

23,696.—DAVIDSON, W. B., "Purification of illuminating and coke-oven gas." Oct. 26.

23,702.—SPENSERS, LTD., and BAIRNSFATHER, B., "Manufacture of air-gas." Oct. 26.

23,748.—GLOVER, S., and WEST, J., "Gas-tight coal-valves." Oct. 26.

23,750.—KENT-JOHNSTON, A. G., "Lighting and extinguishing gas-lamps." Oct. 27.

23,789.—OLIVER, C. R., "Automatically operating gas-lamps." Oct. 27.

23,813.—KIRKHAM, HULETT, AND CHANDLER, LTD., HERSEY, S., and BLAKE, E. W., "Effecting intimate contact between liquids and gases." Oct. 27.

23,863.—BLAKEY, J. W., and SMITH, G. S., "Gas-regulator." Oct. 27.

23,864.—FOWLER, C. H., and MEDLEY, E. A., "Treating gases and vapours with liquids." Oct. 28.

23,871.—LARKIN, F. S., "Gas-cooking and heating-stoves." Oct. 28.

23,879.—STUART-WALKER, S., "Gas-generators." Oct. 28.

23,884.—BESHENKOVSKY, M., "Axle gas-turbines." Oct. 28.

23,912.—GENSECKE, W., "Cooling gases." Oct. 28.

23,930.—SVENSKA AKTIEBOLAGET-GASACCUMULATOR, "Incandescent burners." Oct. 28.

23,944.—GOERDES, F. W., "Igniters." Oct. 28.

Bradford Gas Department.

Addressing his constituents at the close of the municipal election campaign at Bradford, on Monday of last week, Mr. Horace Geldard, the Chairman of the Gas Committee, dealt in detail with a number of charges made by Mr. C. A. Glyde respecting wages at the chemical-works, and showed how, by a rearrangement of hours, the Committee had been able to improve conditions and retain the services of men who would otherwise have been thrown out of employment. He said it was a fact, as Mr. Glyde stated, that the chemical-works had made a profit of £3375 last year; but it should be pointed out that not a single penny was allowed for interest and sinking fund, and the capital account amounted to £28,000. This was explained by the fact that the department was run conjointly with the Gas Department; and the capital charges of the chemical-works were thrown into the accounts of the entire undertaking. He went on to point out the advantages that would accrue as the result of the installation of a system of vertical retorts at Thornton Road works. The Bradford Gas Department, he remarked, was twenty years behind the times; and there was no doubt that this new process, if generally adopted in the city, would result in cheaper gas. He thought the day was not far off when it would be possible in houses to provide gas-fires which would be cheaper, as well as more convenient, than the ordinary coal-fire.

Vyrnwy Water-Works Contracts.

The tender of Messrs. Jowett Bros., of Burscough, has been accepted by the Liverpool Corporation for the construction of a reservoir on the Vyrnwy aqueduct, near Malpas, Cheshire, and for the necessary pipe-laying and other work. Messrs. George Wright and Co., of Kelsall, have received the contract for the erection of an aqueduct station at Hatchmere, including a residence, gauge-house, and office. The new reservoir will consist of a concrete and brickwork circular tank, 240 feet in diameter, with a storage capacity of 4,250,000 gallons. It is being built on Oat Hill, about 450 feet above sea-level. The aqueduct from Vyrnwy to Liverpool, which is 68 miles long, will consist ultimately of three lines of pipes, two of which are already laid. Each line is divided into six sections; and for each section a reservoir is provided in order to reduce the water pressure. The full complement of these reservoirs has been furnished, with the exception of the Malpas section. The new reservoir will thus complete the scheme so far as the second line is concerned. The pipe work includes an overflow-pipe, which is of unusual length, because of the difficulty of finding a stream into which to discharge the overflow.

Hull Gas Exhibition.—The exhibition in Hull which was promoted by the British Gaslight Company, and some reference to which has already been made in the "JOURNAL," proved a great success. The orders taken by the attendants, it is stated, far exceeded anticipations; and the cookery lectures, with paper-bag demonstrations, by Mrs. Dunn, were attended by crowded audiences. More than 67,000 people passed through the turnstiles in the fortnight during which the exhibition remained open.

LEGAL INTELLIGENCE.

GAS COMPANY'S RIGHT TO LAY MAINS.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Monday, Oct. 30.

(*Before Mr. Justice* EVE.)

Schweder v. Worthing Gaslight and Coke Company.

The hearing of this case, the opening proceedings in which were given in the "JOURNAL" last week (p. 327), was resumed to-day.

Mr. P. OGDEN LAWRENCE, K.C., and Mr. B. FARRER appeared for plaintiff; Mr. MACMORRAN, K.C., and Mr. COZENS HARDY represented the defendants.

Mr. FARRER explained that at the last hearing of the action it was agreed that Mr. Woodall and Mr. Stevenson should go down to Goring and inspect the works complained of, and report to the Court. This had been done; and these two gentlemen agreed that the position of the defendants' box gas-main was just free from the joists at the top of plaintiff's tunnel. There was a strip of wood beneath the box. It would therefore not be necessary to go into the matter with other witnesses.

Mr. *Mansfield* said the tunnel would be used to give access from the plaintiff's garden to the fields on the other side of Goring Lane. There was a water-pipe through the tunnel.

In cross-examination by Mr. MACMORRAN, witness said the tunnel could only be used by a person on foot, and had been used only on nine or ten occasions.

Mr. *E. H. Stevenson* said he went with Mr. Corbet Woodall and examined the road, which he considered was at present quite sufficient for the wants of the district. He thought a steel gas-main could be laid in the road 6 inches below the surface if concrete was put on the top; but he would prefer it should be put lower. He would suggest, as an alternative to what had been done, that a greater number of pipes should be laid, but of smaller dimensions.

Cross-examined by Mr. MACMORRAN: He had given evidence in both Houses of Parliament against the defendants' Bills. All the landowners in the neighbourhood were anxious to prevent the gas-works being erected as proposed. It was not unusual to lay a 10-inch gas-main 6 inches from the surface—more especially over bridges. He thought the full weight of the defendants' main now rested on the girder in plaintiff's tunnel.

This concluded the evidence for the plaintiff.

Mr. FARRER then summed up the case, and quoted authorities.

Tuesday, Oct. 31.

On the resumption of the proceedings this morning,

Mr. FARRER argued at length in support of the contention that it was only the surface of the road that was dedicated to the public, and that the proper course for the defendant Company to take, if they wanted to lay pipes, as they had done, was to get compulsory powers, and then proceed under the Land Clauses Acts.

The Case for the Defendants.

Mr. MACMORRAN said the defendant Company had supplied the town of Worthing with gas as far back as 1869. Recently it became evident that it would be necessary to provide further works, and to do so a Bill was introduced into Parliament. It was proposed to acquire certain lands in the parish of Goring, which was almost beside Worthing. Of course, the neighbouring landowners did not like the prospect of gas-works near their residences; but notwithstanding their opposition the Bill in Parliament was passed, and power given to the Company to acquire land for the purpose of new works. The power was obtained in 1907; but no steps were taken till 1909, as it involved an expenditure of some £12,000. In 1909, the Company decided to go on with their work, on the advice of their engineer that the present works were getting inefficient for the needs of the locality. Then Mr. Schweder began to construct his tunnel. Though he had no doubt a right to make the tunnel, he had no right to break up the road to put in his girder for the formation of the tunnel, as he had done, without any authority from the local body. No doubt the legal points raised by his learned friends for the plaintiff were very interesting; but he would say that, if his learned friends were right, it would be impossible for any gas, water, or electric light company to lay mains in any district urban or rural.

Mr. *Corbet Woodall* said his firm (Corbet Woodall and Son) were Consulting Engineers to the defendants. The box main put in by the defendants in Goring Lane was wholly independent of the tunnel for support; but he thought the contractor cut away some of the concrete below the joists of the tunnel. The defendants, rather than lay the pipes on the concrete, put in some soft wood, and filled in the space round the main with concrete. This made the best possible support for the roof of the tunnel. The girders of the tunnel roof could be removed any day without interfering with the stability of the box main of the defendants.

In cross-examination by Mr. FARRER, witness said the main did not rest on the girder, but was divided by some wood at least ⅛ inch thick at present. The pipes could be laid as Mr. Stevenson suggested; but there was no reason why they should be. The work of the Gas Company was carried on expensively and extravagantly at present owing to the need of the proposed works; and this, of course, would eventually fall on the ratepayers and customers of the Company.

Mr. *H. P. Maybury*, the County Engineer for Kent, said the roof of the plaintiff's tunnel, as it existed, with the defendants' pipes as they were, was not any less able to support the road above it than it would have been had the pipes not been there. It was quite strong enough to bear any locomotive that might be licensed to go on the highway.

This closed the evidence for the defence.

Mr. COZENS HARDY having further argued the legal points raised,

Judgment.

His LORDSHIP, in giving judgment, said no doubt the adjoining landowners objected to the very unsightly erections which were necessary to the making and supply of gas; but the Legislature thought the gas needs of the locality must prevail over the wishes of the landowners, and they had passed the defendants' Bill. The plaintiff then sought to see if he could so use his own property as to thwart the further intentions of the defendant Company in laying mains. He accordingly built a tunnel—partly for the purpose of making his property more accessible, and partly for the purpose he had referred to. This was completed in September, 1910, before the Company had laid their mains. The defendant Company—it might be stirred into movement by plaintiff's proceedings—the following December, with a considerable amount of industry and with the view of getting the work finished before the plaintiff could interfere, proceeded to lay the mains in the manner complained of by the plaintiff. The report of the engineers who had gone down to examine the main showed that, to all intents and purposes, it did rest upon, and to a certain extent in and through, the roof of plaintiff. The question he had to decide was this: Was the position of the main, under these circumstances, sanctioned by any statutory powers conferred on the defendants? He had come to the conclusion that the tunnel in question was a building; but he did not think it was a building with which defendants were entitled to interfere, and therefore they were bound to restore it to the condition in which it was previous to the interference. He was not prepared to say that the defendants had acted *ultra vires* in constructing the main in the way they had done. This being so, the plaintiff had been the victim of a trespass which he was entitled to have abated. Accordingly, the relief to which he was entitled would take the form of a mandatory injunction requiring the defendants to abate the trespass. But as the case might go further, he would suspend the injunction for a month, to enable the defendants to consider their position. The defendants must pay the costs of the action.

WATER SUPPLY FOR WORKHOUSES.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Monday, Oct. 30.

(*Before Mr. Justice* EVE.)

Bristol Guardians v. Bristol Water-Works Company.

In this action, the plaintiffs asked for a declaration that, under the Bristol Water-Works Act, 1862, their workhouses and buildings in the parish of Bristol were entitled to a supply of water for domestic purposes at the rates prescribed by section 68 of the Act. Defendants said that none of the premises in question were "dwelling-houses" within the meaning of the Act; and also that, as in April, 1905, the plaintiffs agreed with them to pay for the water at the price of 1s. per 1000 gallons, this agreement was still binding upon them.

Mr. DANCKWERTS, K.C., and Mr. E. WETHERED appeared for the plaintiffs; Mr. UPJOHN, K.C., and Mr. D. M. KERLY represented the defendants.

Mr. DANCKWERTS, in opening the case, said the question which his Lordship would have to determine was whether or not the plaintiffs were entitled to a supply of water from the defendants for domestic purposes, and on what terms. The position of the plaintiffs was that they were entitled to a supply of water for domestic purposes calculated at a percentage on the scales in the Act named, on the annual gross rateable value of the premises. It was on this point alone that the plaintiffs asked for a declaration from the Court. They were now getting a supply under an agreement which had not been sealed, and therefore was not binding. At present they were being supplied partly from the defendants at the meter rate, and partly from wells, quarries, &c., of their own. Some of the water was used for domestic and some for non-domestic purposes; but his Lordship would not be troubled with regard to the latter, as this was a matter for adjustment. The question to be decided related to five different workhouses and buildings in the parish of Bristol—viz., the Eastville and Stapleton Workhouses, St. Peter's Hospital, the Children's Homes, and the Fishponds and Southmead Workhouse. By section 68 of the Act of 1862, it was provided that the Company should, at the request of the owner or occupier, furnish every dwelling-house in any street or road within the limits of the Act, within 100 yards of which one of their mains had been laid, with a sufficient supply of water for domestic purposes for the use of such occupier, at a price not exceeding the rates in the scale appended to the section. Under this section, the plaintiffs asked for a declaration that they were entitled to a "sufficient supply of water" from the defendants, to be used for domestic purposes under the terms of the Statute, at the rates prescribed. His Lordship might take it that the buildings in question were inhabited by the paupers who lived in them. In the Eastville Workhouse there were 1268 paupers, and in the Stapleton Workhouse 1231. He admitted that in 1905 an agreement was signed by the plaintiffs to take the water for domestic purposes at 1s. per 1000 gallons; but he submitted that this did not bind them for the future. The Court of Appeal had laid it down that a workhouse was a dwelling-house.

Mr. *Simpson*, the Clerk to the Guardians, said the quantity of water used was about 30 gallons per pauper per day.

In cross-examination, witness said the workhouse buildings comprised a mortuary, a warehouse where coffins for the paupers were kept, shoemakers', carpenters', and smiths' shops, 57 baths, and 133 water-closets.

Re-examined: All the shops were used for the purposes of the

workhouse, and everything was made there, except firewood and a few mats used by the inmates.

This closed plaintiffs' case.

Mr. UPJOHN, for the defendants, said the point on which he should defend was section 68 of the Act of 1862. In order to succeed, the plaintiffs must satisfy the Court that they were the owners and occupiers of a private dwelling-house in a public street or road within the limits of the Act, in which, or within 100 yards of which, had been laid the pipes of the Company. The real question would be: Were the places named private dwelling-houses? He contended that they could not possibly be so; and he quoted authorities in support of his contention. How could a place be a private dwelling-house, when any ratepayer who became impecunious had a right of entry, and if he became a lunatic he would be forcibly immured there? The only obligation under the Act of 1862 was that the defendants should supply water for domestic purposes to the "owner or occupier of a private dwelling-house." He submitted that the pauper was neither the owner nor the occupier of the workhouse, nor was a workhouse a private dwelling-house. The plaintiffs, who were the owners, were a public body incorporated for public purposes; while the workhouse itself was a public institution vested in a public body. The paupers could not be called occupiers, as when they once got in they could not leave without a special permit. They lived in common, and had no voice either in the management of the establishment or in the admission of others into the building. The learned Counsel quoted a number of authorities in support of his contention.

Mr. KERLY followed on the same side.

Mr. DANCKWERTS replied at length; contending that the workhouse was the private dwelling-house of the Guardians, though they had to use it for a statutory purpose. It was for the use of a family of which the Guardians had charge; and was "private" in the sense that it was the individual property of the Guardians, and nobody was entitled to have access to it except a privileged class under certain conditions, to whom the Statute gave the right to use it.

His LORDSHIP, in giving judgment, said the claim of the plaintiffs to have their workhouses supplied with water for domestic purposes at the rates provided for "owners and occupiers of private dwelling-houses" was calculated materially to diminish the payments made by them to the defendants. The dispute turned upon the provisions of the defendants' Act of 1862, that water was to be supplied at certain rates to the "owners or occupiers of private dwelling-houses." Could it be said that the inmates of workhouses, the sick in infirmaries, the children in the homes, the attendants, and the certificated nurses could all be described as occupiers of private houses? The conditions of the workhouse in these respects were identical with those of prisons and similar institutions. So that if the plaintiffs were entitled to their declaration on the footing that the workhouses were private dwelling-houses, in due course people in charge of prisons and penitentiaries, and other institutions, might come and make a similar demand on their own behalf. The conclusion at which he had arrived, on the words of the section, was that it would be impossible to hold that an institution such as one of those in question was what would answer generally to the expression "private dwelling-house." To extend the words in this way would be to include in the category a number of public institutions and business premises; and he felt he must give the ordinary and usual signification to the words used. This decision made it unnecessary to deal with some of the other arguments; and he must therefore hold that the plaintiffs had failed, and that the action must be dismissed, with costs.

ACTION AS TO BUNGAY WATER COMPANY'S SHARES.

Alleged Fraudulent Misrepresentation.

In the King's Bench Division of the High Court of Justice last Tuesday, Mr. Justice Bray and Mr. Justice Bankes had before them an appeal in the action of *Flood v. Hartcup and Sons*, resulting from a deal in shares in the Bungay, Harleston, and Eye Water Company, in which fraudulent misrepresentation was alleged.

Mr. Ralph Bankes, K.C., and Mr. Waldo R. Briggs appeared for he appellant; Sir Frederick Low, K.C., M.P., and Mr. Ernest E. Wild represented the respondents.

According to the opening statement of Mr. Bankes, the action was brought in the County Court of Sandwich, and the Deputy County Court Judge held that there was no evidence to go to the Jury. It was against this decision that the plaintiff appealed. In 1909, a Company was brought out called the Bungay, Harleston, and Eye Water Company; and there was a public issue of shares, with a guarantee of 6 per cent. interest for one year. The Company was a hopeless failure; the contractor became bankrupt, and few shares were issued. In 1910, somebody was desirous of selling his shares; and a circular was issued, upon which the plaintiff, an ironmonger at Sandwich, purchased them. It stated that interest at 6 per cent. per annum, payable half-yearly, was guaranteed until the works for the supply of Bungay were completed, when the Company would be earning a considerable revenue from this portion of their authorized parliamentary area. The vendor of the shares was Mr. E. O. Preston, who arranged with the defendants, the Solicitors to the Company, to send out the circular in their name offering 300 ordinary shares and ten debentures. The plaintiff thought the circular was issued by the Company, and considered the guarantee for payment of interest was by them. He applied for fifty shares, and paid a little less than £50 for them. On the 1st of November interest became due; and as no money was forthcoming, the plaintiff wrote to Messrs. Barclay, the bankers, who referred his letter to the defendants; and on the 7th the Secretary of the Company wrote referring plaintiff to the seller of the shares, who was a bankrupt. It was submitted before the Deputy County Court Judge that if the circular contained statements which defendants knew to be untrue, or the statements were made recklessly, the plaintiff was entitled to judgment.

On behalf of the respondents, Sir Frederick Low submitted that a guarantee necessarily imported a third party; and it was absurd that a company should guarantee to perform an act they were liable to perform. That disposed of the fraud. They could not ask a man to answer a charge of fraud without putting before the Court some evidence of fraudulent intention on his part. It was an absurd proposition to say that the shares became more valuable because the Company had entered into the solemn farce of guaranteeing the interest on their own shares. The defendants never concealed the fact that Mr. Preston was the vendor. This could not possibly be taken as a sale by the Company.

Mr. Justice Bray said the case must go for a new trial. The Court had to look not only at the true legal construction, but to the construction that other people might reasonably put upon the circular issued. Where the learned County Court Judge had gone wrong was in saying the document was not normally capable of bearing the construction the plaintiff had placed upon it. It was for the Jury to say whether the plaintiff put such a construction upon it and acted upon it. It was also necessary for him to show that the Solicitors knew that the circular might be construed as having two meanings, one of which was false. If there was a new trial, the Solicitors would be called, and the Jury would have a good deal of new evidence before them. He would not say any more, except that it appeared to him that there was evidence which should have been left to the Jury. His Lordship made the following order: Appeal allowed, with costs. The action transferred to the High Court for a new trial, the cost of the first trial to abide the result of the second.

Debentures in the Tewkesbury Gas Company.

Last Thursday, the appeal of defendants in the action of *Tysoe v. Tewkesbury Gas Company* came before the Master of the Rolls and Lords Justices Moulton and Farwell. The proceedings in the Court below were reported in the "JOURNAL" for July 4 last (p. 49). The plaintiff claimed a declaration that the mortgage debentures issued by the Company constituted a first charge on all the property, and that his debenture for £100 had become payable. For the Company, it was argued that the debentures, owing to the conditions under which they were issued, were perpetual, and were not payable unless the Directors elected to pay, in which case they must hold a ballot. Mr. Justice Parker decided against the Company; and the Court of Appeal, without calling on the respondent's Counsel, upheld this view, and dismissed the appeal, with costs.

East Hants Gas Company, Limited.

In the Chancery Division of the High Court of Justice last Friday, Mr. Justice Parker had before him the affairs of the above-named Company, on a motion for the rectification of the register. Counsel said he moved to rectify the register by removing the name of Mr. Thomas P. Hancock as the holder of 29 "A" shares in the Company. The cause of the trouble was that, owing to a mistake made by the vendor, and unfortunately supported by the Company's Engineer, there had been a very serious misstatement as to the output of gas. This was discovered by the Board of Trade inspector, and, as a result, an order was made for the purchase price to be reduced by £9000 in cash and £9000 in shares. Out of £21,000 shares issued, holders of £1700 had demanded their money back; and orders had been made to rectify the register to this extent. The shareholder now applying to the Court was ill at the time, and the matter did not come to his knowledge until July of this year. He now applied to be allowed to follow the other shareholders who had withdrawn their money. The original capital of the Company was £30,000. His Lordship made the order.

Costs of Promoting a Water Bill.

In the King's Bench Division of the High Court of Justice last Saturday, Mr. Justice Phillimore and a Special Jury had before them an action brought by Mr. Herbert Deane, Solicitor and Parliamentary Agent, against Mr. George Taylor, a Director of the Kingswood Water Company, to recover, under a guarantee, £220 in respect of costs incurred in the promotion of a Bill in Parliament. The defendant counterclaimed for a rescission of the agreement, alleging misrepresentation. Mr. T. M. Healy, K.C., who appeared for plaintiff, explained that the defendant participated in a scheme to provide Kingswood and the district with a water supply. A private Company, known as the Kingswood Water Company, was formed, and, with the object of getting the scheme sanctioned, defendant and a co-Director named Talbot promoted a Bill, depositing a sum of £665. A competing scheme, promoted by the Sutton Water Company, was, however, passed by Parliament, with the result that the Bill of the Kingswood Company was thrown out. At the instance of a debenture-holder, a Receiver was appointed in connection with the Company; and Mr. Deane obtained an order to prevent the £665 deposited from being paid out. Plaintiff's case was that he abandoned the order on the defendant agreeing to let him have £220 in respect of moneys paid in connection with the promotion of the Bill. It was argued, on behalf of the defendant, by Mr. Arthur E. Hughes that Mr. Taylor was induced to sign the agreement to pay the £220 by reason of plaintiff representing that he had a legal charge on the deposit. The Jury found in favour of the plaintiff; and his Lordship accordingly entered judgment for Mr. Deane on the claim and counterclaim, with costs.

Torquay Water-Works Farm.—The Torquay Town Council have brought to a close the farming operations which they have carried on for some years on part of the watershed. Accounts presented to the Council last Wednesday showed that £93 had to be paid from the water-works revenue to balance the accounts. Several members sharply criticized the accounts, and contended that the result of the experiment had been a loss of several thousand pounds to the ratepayers. This, however, was denied, and it was urged that, in any event, the management of the farming operations by the Water Committee had resulted in the preservation of the purity of the supply.

CONVERSION.

This Season is marked by the advent of a number of fittings for converting coal grates for use with gas.

Amongst these the "ADAPTABLE" easily holds first place. When we designed and named this fire we had in mind its purpose—viz., to adapt; to make suitable; to fit. The "ADAPTABLE" fits any interior and makes it suitable for use with gas. Its efficiency is equal to that of any ordinary gas fire.

The "Adaptable."

It is not a separate unit. It fits into and forms part of the coal grate. It is raised sufficiently off the floor to clear existing bottom grate. No structural alteration is required. The burner, &c., is interchangeable with our "D.S.O." series of Fires.

When adapting existing grates for use with gas, why not use the best means to the desired end, instead of fitting box arrangements which project from the grate, which are separate units, and which spoil the appearance of expensive and artistic Registers.

The same advantages apply to the "SANTA CLAUS," which is a development of our well-known "St. Nicholas" Fire.

The "Santa Claus."

R. & A. MAIN, LIMITED,

WORKS: Gothic Works, EDMONTON, N.; Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes St., Oxford Circus, W.; 136, Renfield St., GLASGOW; 56, Broad St., BIRMINGHAM; 83, Old Market St., BRISTOL; 13, Whitworth St. West, MANCHESTER; 8, Exchange Place, Donegall St., BELFAST; 333, Queen St., MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

FENLON'S BOILERS AND GEYSERS.

THE "DWARF-LORNE" (Cast-Iron) GAS BOILER AND RADIATOR COMBINED,

Both fitted in Motor House, &c.

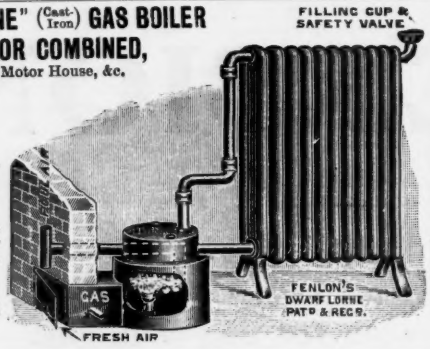
The only make with Safety Valve (Fenlon's Patent).

No outside shed necessary

All heat from boiler utilized inside.

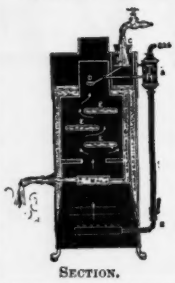
Lighting from outside and flue passing to outer air, no gas fumes can enter the house.

THE IDEAL SYSTEM FOR PURE HEAT.



THE "TUDOR" GEYSER.

"THE LAST WORD IN GEYSERS" with Automatic Eccentric Valve.



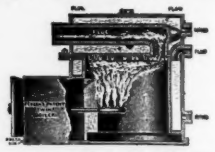
SECTION.

The Valve is made entirely of metal, and having no rubber or leather parts is practically indestructible

As the "No trouble" Geyser it will appeal to Gas Managers for hiring out.

THE "TWIN" (Double Compartment or Duplex) BOILER.

Two Boilers from one fire. Giving perfectly clean water for Domestic Supply (no discoloration), and also a



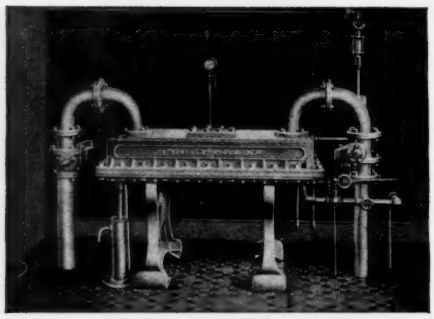
separate Heating System for Radiators, Pipes, &c.

Easily cleaned without disconnecting a single pipe.

Full Particulars (List 27) sent free on request.

FENLON & SON and G. SHREWSBURY & CO., 8, Tudor Street, London, E.C. ESTABLISHED 1866.

NAPHTHALINE AND ITS CURE.



THE "SIMPLEX" VAPORIZER.

THE "SIMPLEX" VAPORIZER.

This Apparatus is specially suitable for the prevention of Naphthaline deposits in the districts.

Fixed near the inlet or outlet of Gasholder, it can be used to vaporize a suitable Hydrocarbon into the Gas in such quantities as to entirely prevent the deposition of Naphthaline in the mains or consumers' services.

Adopted at Hampton Court, Great Harwood, Clitheroe, Jersey, Kilmarnock, Hornsey, Gt. Yarmouth, Walton-on-Thames, Banbury, Warwick, Cleckheaton, Mitcham, Liverpool, Brisbane, Merthyr Tydfil, St. Albans, Waltham Cross, and Rotherham.

PRICES AND FURTHER PARTICULARS CAN BE OBTAINED FROM

ROBERT DEMPSTER & SONS, LTD., ELLAND, YORKS.

DESSAU VERTICALS.

Adopted all over the World.

Total Carbonizing Capacity over 81 million cubic feet per diem.

Total Installations to date - 86.

FOR FULL LIST OF INSTALLATIONS, SEE INSTITUTION NUMBER OF "JOURNAL."

THE VERTICAL GAS RETORT SYNDICATE, LTD.,

17, Victoria Street, Westminster, S.W.

MISCELLANEOUS NEWS.

GAS COMPANIES' PROTECTION ASSOCIATION.

The Annual Meeting of the Association was held at the Westminster Palace Hotel on Monday, the 30th ult.—Mr. H. E. JONES in the chair. The names of the members present were published last week, together with the report of the Committee.

The SECRETARY (Mr. F. E. Cooper) read the minutes of the last meeting; and they were confirmed.

SYMPATHY.

The CHAIRMAN said he regretted to say that one of their members, Mr. W. Belton, of Shrewsbury, had lost his wife; and those who knew him, and some of them had done so for many years, would extend to him their sympathy in his bereavement. As an Association, they would, he thought, like to instruct their Secretary to write to Mr. Belton to the effect that those present desired to express their profound sympathy with him.

This was unanimously agreed to.

FINANCIAL MATTERS.

The report of the Committee having being taken as read,

The CHAIRMAN said it was his pleasure to move the reception and adoption of the accounts, and the report accompanying them. The income of the Association for the year had been £483. New members had given them £17 17s.; and arrears (£6 6s.) made a total of £507. Of this sum, the Secretary's salary, printing, subscription, rent of meeting-room, petty cash payments, and so forth, absorbed £285, leaving a balance of rather more than £221. This was supplemented by interest on Consols, amounting to nearly £30; so that the balance in hand was £251. There was a little unascertained liability which he would deal with when he came to the report.

THE STANDARD BURNER BILLS.

The Association year had been an eventful one, inasmuch as the danger which threatened the Joint Standard Burner Bills by opposition in the House of Commons was, by the good tactics of the Liverpool Gas Company, allayed and relieved. The Bills therefore became law; and, of course, the Acts had established a valuable precedent, and established beyond all dispute the "Metropolitan" No. 2 burner as the standard one. To find almost immediately after this that the Manchester Corporation had already adopted the burner in their own working was rather startling news to him, when he considered the extraordinary attack that had been made in different quarters on the so called injustice of the burner. And when actually the Liverpool Corporation, for their gas-works at Fazakerley, introduced a Provisional Order the very next session to enable them to adopt the burner, one felt that one great benefit arising out of the lengthened and costly proceedings on the Joint Bills seemed to have been to gradually educate those who had been the champions against, or the chief opponents of, the application of the No. 2 burner; and they saw that both professional gentlemen concerned had lost no time in adopting the very burner which had been the bone of so much contention. This was very satisfactory.

SALE OF LAND BY GAS COMPANIES.

There had been, in the course of the year, two or three other matters to deal with, which were also interesting. They had been endeavouring to get the ear of the Government in two directions. Mr. Hanbury Thomas, of Sheffield, had pointed out that the Finance Act of 1910 might act very adversely to the interests of gas companies who had land to sell, because they would have to pay a large premium on the enhanced price which they would get for it. Mr. Thomas thought the money represented by this enhanced price ought to go towards the cost of acquiring a new site for, and the erection of, new gas-works. But after communicating with the Chancellor of the Exchequer, and asking him to receive a deputation on the subject, they had a short and emphatic statement that he saw no reason whatever to entertain any deputation on the matter. Practically the effect of the answer was that he saw no reason to differentiate.

MUNICIPAL ELECTRIC LIGHTING PRACTICES.

Then they took up another question with the President of the Local Government Board—that was, the question of the practice of municipalities, which was almost universal wherever the electricity supply undertaking was in their hands, of swelling the revenue by putting up electric lights in the streets and roads of an inferior character for lighting at a higher price than they charged other customers in their areas, and very much higher than the gas companies would give a better service for; and yet when the electric undertakings made a loss (as the Association were able to point out to the President of the Board a number did annually in different places), the ratepayers, of which the gas companies were generally the largest in the town, had to make it up. So that in this way the gas companies had their throats cut, and then had (so to speak) to pay for the knife with which it was done. The Committee had got on with this matter so far. They had had a little correspondence with the department, who wished them to formulate very distinctly the grounds on which they desired to discuss the matter. The Committee had appointed an influential Sub-Committee to go into the whole question, and to prepare such a synopsis and such a statement as should be convincing upon these points. An old-established industry like that of gas supply did not have many friends in these Government departments. Quite naturally enough, to them possibly electric lighting was a young industry; it was still quite in its childhood; and it had to be nursed to some extent to enable it to grow into a strong man. They did not sympathize so much with gas companies, who were known to be paying good dividends; but they could not get rid of the logic of facts. No matter how weak the electric light undertakings might be in finance and youth, no matter how very strong the gas companies might be in finance, manhood, and vitality, the former could not compete with the latter in price, and inevitably they lost on their electric undertakings, and then they threw the loss on to the shoulders of the ratepayers, and especially upon the large contributors to the rates—the gas companies.

PEACEFUL PICKETING.

Then the Committee had lately authorized him to sign, on behalf of the Association, a memorial addressed to the Prime Minister with reference to the Trades Disputes Act, in regard to which they took exception, with almost all the Chambers of Commerce throughout the kingdom, to what was known as peaceful picketing, which process led to the breaking of a good many heads during the recent strikes in London, Dublin, and other parts of the kingdom; and it extended a most calamitous and injurious condition of things to many days beyond what it would naturally have lived if only the free and willing labourers had been allowed to do the tasks which the disputing, rebellious, and discontented labourers had thrown up. He did not wish to use hard terms. So little did he sympathize with any hardships being inflicted upon labouring men, that he might say he was one of the first, when he realized that provisions and other expenditure of the working class had gone up so seriously as they had done, to recommend to the companies in and around London with which he was connected that the men should have an addition to their wages, apart from any request coming forward from them. Therefore, it would be seen, speaking as he had done about the rights of peaceful picketing, he was not against men who reasonably and properly wished to be better remunerated when expenses overtook their income.

INFORMATION THROUGH THE SECRETARY.

There was a long list of subjects over which the Secretary had been in communication with various gas companies who desired information. It would be seen what a wide area they covered—from the question of the allowance of depreciation for income-tax purposes to that of the right to erect a gasholder. It was very handy for the members of the Association to have the opportunity to obtain legal opinion on many small points upon which in their own offices they had no information. They were glad to give these particulars. Wide, however, as was the scope of the Association, of course it must be kept to the giving of this sort of legal and legislative advice, and to the watching of legislation that went on in the country, and the difficulties that threatened gas companies. The Association could not very well undertake such publicity work as the new Commercial Gas Association was going to engage in. It could not contend with the tissues of misrepresentation which needed to be contradicted in connection with electric lighting, and which was the subject of some discussion at the last annual meeting; nor could it take up such questions as dealing with residuals, or any prejudice that might be attached to any residual, such as had recently been attached to coke, by the assertion that it furnished arsenic in the preparation of glucose used in brewing. The Association could not undertake these matters, much as they sympathized with them. When they realized that their Secretary had not only to meet the varied questions such as appeared in the report, and to carefully watch legislative matters, it would be seen that he could not possibly find time to embrace these other branches of the subject, much as they would all like it to be done. Then, again, with regard to the competency of the Secretary of the Association to deal, by writing letters, with questions of local dispute. If he did so, the people in the locality would simply say, "Who is this gentleman who writes these letters?" and when they learned that it was the Secretary of the Gas Companies' Protection Association, of course they would say that what he said was one-sided and biassed.

STEAM-ROLLER LEGISLATION.

One other point he had not touched upon. He had personally to confront a very difficult legislative attack which was intended to set aside, by a fight in the Committee rooms, the decision under which gas companies could obtain damages when a steam-roller broke their pipes. He brought the case under the notice of the Committee of the Association. The Company on which the attack fell was only a small one. What it was desired by the Company's opponents to bring about in the Committee rooms was a clause fixing a 20-ton steam-roller as the limit that could pass over the pipes of this small rural gas company without any compensation for damage that might be occasioned. The Committee of the Association unanimously saw the matter in the right light, and said, as the opposition had been carried into the second House, they would give a contribution to the Company towards fighting the matter. Unfortunately, the costs had not come in. Therefore the amount could not be included in these accounts. It was probable that the costs would be some £300; but the Association would not pay much more than half, or at any rate not more than two-thirds of the sum. This was one of the things to which the funds of the Association could be very properly directed. They could not expect a small company to contest single-handed such a matter as this. These people always attacked the small companies, seeing that they knew the larger companies would fight them from top to bottom. The particular instance to which he was alluding had reference to a Provisional Order; and there was an attempt made to get from the Under-Secretary of the Board of Trade this exemption from liability to damages caused by a steam-roller. But the Under-Secretary said that he could not give the authority who asked for this any protection other than that which was afforded by the Gas-Works Clauses Act of 1847. The Order was incorporated in a Confirmation Bill. Then their opponents attacked the Company again in the House of Lords, where they were easily beaten; and afterwards they renewed the attack in the Commons, where they were also beaten, after a great deal of discussion. He hoped the members would see that, although this was not directly a measure promoted by the Association, it was one in which they had to see that an important precedent was not established. Had one been established in this instance, it would have made it very difficult for other gas companies to have resisted a steam-roller clause in the future. It would, in his opinion, be a fatal thing to permit in any direction such a clause, especially when it was sought to be obtained through a small company too weak to do itself justice. He should like to utter a word of warning to those representing small companies. In certain cases in the Committee rooms by agreement (which did not

form a very important precedent, but simply a precedent *sub silentio*) such clauses had been granted. He said very earnestly, "Please do not give away your position under the common law." The common law was that, if anyone brought an undue weight to bear upon the surface of any road where there were gas-pipes and injured those pipes, he was responsible for the damage. He had to pay; and fortunately for gas companies the members of the Committee in the second House, in the case to which he had referred, saw that what was proposed was an injury to the gas company's common-law rights; and they even refused a clause which the company's own Counsel prepared, which would, in his (the Chairman's) opinion, have been rather a dangerous invasion of these rights. They said "No; we will leave the position as it is." He had spoken at some length on this subject as he believed it was highly important to gas companies throughout the country.

Mr. C. E. Botley (Hastings) seconded the motion.

Mr. R. W. Edwards (Aldershot) remarked that last year he raised the question of an epitome being given of the answers supplied by the Secretary to the list of questions addressed to him. What he would like to see would be an epitome in the report that would give all the members the benefit of the information furnished to one company, so that they might avoid causing the Secretary unnecessary trouble when a similar point happened to come before them.

The Chairman said that last year he was rather of Mr. Edwards's view, and so was Alderman Hart; but after considering the matter, they decided it would not be politic to publish the information abroad.

INCOME-TAX QUESTIONS AND STEAM-ROLLERS.

Mr. Edwards (proceeding) said the first matter mentioned in the list was that of depreciation allowance for the purpose of income-tax. He for one should like to know what advice had been given, and how they really stood in this matter. Were the Committee taking any steps in respect of it to get on some settled lines on which they might work in the future? At present, they were in a state of confusion as to what was to be allowed in the matter of income-tax, and what was to be subject to income-tax. He was afraid his own small Company were not large enought to undertake a fight over the matter; and he really thought it was one of those affairs which should be taken up from the imperial point of view, and settled for all companies.

The Chairman: That is a question of law you know.

Mr. Edwards said the next point had reference to the contributions to the special purposes fund. The income-tax man made them pay on these contributions to the special purposes fund; and he told them that, when the money was spent, he would allow it. His Company were under the impression, and he thought rightly so, that these contributions, being part of the expenses of the Company, were free from taxation. He should like to see the point dealt with by the Association, and individual companies left free from these constant bickerings with the income-tax authorities. In the case of his Company they had discussed the matter; but he had reluctantly to come to the conclusion that, for the time being, one must submit to the taxation. As to steam-rollers and traction-engines, he did not think anyone could be worse off than his Company. They had in their area thirty parishes and two county councils; and they had very peculiar ideas on this subject. He had also military transport; and the War Department were now taking up mechanical traction. When in Parliament in 1909, they were asked to agree to a 15-ton roller. A 15-ton roller might be safe in one road, but it would not be so in another. What was therefore agreed to was that a roller of reasonable weight, having regard to the subsoil, might be used. But, of course, there came in the difficulty of proving what was a reasonable or an excessive weight. He congratulated the Association on the bold fight that had been made over the Standard Burner Bill.

The Chairman said they were obliged to Mr. Edwards for raising these points. He sympathized with the idea of having printed an epitome of the Secretary's replies to the questions addressed to him; and at the last meeting he almost promised that it should be carried out. But when they came to discuss it in Committee, many points arose. If an epitome was printed, they would be enlightening people who were not members of the Association. But if any member was interested in any point raised in the list, he could obtain the information that had been given by applying to the Secretary.

Mr. Edwards: If the information is available to the members on application, that meets the point.

MORE ON THE DEPRECIATION QUESTION.

The Chairman said with regard to the question of allowance for income-tax, he was an income-tax commissioner himself, so that he knew the question from both sides. Undoubtedly gas companies were entitled to an allowance; and if they went before the final commissioners, they would get justice done them—though they might have to come to London for it. A circular that was issued by the Inland Revenue Department about three years ago was to the effect that no allowance should be made to gas companies, except in respect of what was actually spent in depreciation. A more ignorant circular than this was never issued; and gas companies had had, in consequence of it, to go on prosecuting appeals ever since. Take a gasholder, a 2 per cent. allowance on the cost had been a traditional allowance for years. A gasholder would last for perhaps fifty years; but from the first year that it entered upon its duty, it began to depreciate. Unless they provided a sum for this, they would be trading falsely, because some day the holder would have to be renewed. Then there were coin meters, these had become a large and expensive matter. The Commercial Gas Company had now 80,000 prepayment meters against 20,000 ordinary ones. This meant that they had had to put into each one of 80,000 dwellings some £5 to £6 in a coin meter, fittings, burners, piping, and stove. Then what happened? They knew perfectly well that, if they took the fittings out within six months after putting them in, they could not sell them at their cost. There was a certain amount of depreciation going on all the while; and at the end of fourteen or fifteen years, probably the whole lot of them would have to be renewed. The Board of Trade Auditor who regulated the accounts of the four largest London Gas Companies—the Gaslight and Coke, South Metropolitan, Commercial, and Brentford—passed the charges for depreciation as a matter of course. He had never yet met with an income-tax commissioner who, when the argument was properly put before him, did not yield to it. There had, of course, been cases where depreciation had been a little overdone. Two or three cases were suggested to the Committee; and they found they were rather heavy, and that there would have been a difficulty in establishing a full case. But there was no question about gas companies being entitled to an allowance for depreciation. There was a company not far from Canterbury who gave way at once, and in another case the claim was made for some sixteen years back.

After further discussion, the motion for the adoption of the report was carried unanimously.

THE COMMITTEE.

The Chairman having reported that there were now 116 undertakings members of the Association,

On the motion of Mr. C. W. Braine (Wandsworth), seconded by Mr. T. H. Hazell (Newport, Mon.), the retiring members of the Committee [as mentioned in the report, *ante* p. 329] were re-elected, and Mr. Alex. A. Johnston (Brentford) was appointed to succeed Mr. William King, who did not offer himself for re-election.

Mr. J. R. H. Jacobs (Southampton) proposed a vote of thanks to the Chairman and Committee; and this having been seconded by Mr. Edwards, was cordially agreed to.

CONTRIBUTIONS TO SPECIAL PURPOSES FUND.

The Chairman, in the course of his acknowledgment, said with regard to the question of taxing contributions to the special purposes fund (a matter to which Mr. Edwards had referred), he thought that if a small company were "bullied" by a collector over this matter, and they could not afford to get the assistance of someone like Mr. William Cash or Mr. Schultz, the Committee of the Association might, on representation being made to them, consider the question of contributing to the expenditure for the purpose, because it was vital gas companies should escape from the mesh which was being drawn over them in regard to such matters.

Mr. Edwards thought the Inland Revenue Commissioners should be directly approached in regard to the matter.

WEAR AND TEAR OF PREPAYMENT METERS.

Mr. T. H. Hazell (Newport, Mon.) asked whether he understood correctly that in the case of particular companies there had been an allowance in respect of prepayment fittings.

The Chairman said he thought there had been.

Mr. Hazell said he mentioned the point because, in his own case, he had had to fight the question; and he had not up to now succeeded in naming an English company who had had the allowance granted to them. There were Scotch and Irish companies. With regard to the circular issued by the Inland Revenue authorities, he understood it had been withdrawn.

The Secretary (Mr. F. E. Cooper) said he had written to Somerset House, and inquired whether the circular had been withdrawn. The reply was that the circular had not been withdrawn. They still believed that the way the surveyors were advised in the circular was the best; but they had intimated to the local Commissioners that they were free to ignore the circular if they desired.

This concluded the proceedings.

THE NOTTINGHAM GAS ENGINEERING VACANCY.

[From Our Local Correspondent.]

Thursday last was the latest time for sending in applications for the office of Engineer and Manager of the Nottingham Corporation gas undertaking, rendered vacant by the resignation of Mr. J. H. Brown, who has held the appointment for nine years. Information gathered from official quarters indicates that there are a large number of applicants (some 90), including many already occupying important positions in the gas profession. Though it is recognized locally that the matter is one which admits of no delay, it is improbable that any definite choice will be made until early in the coming month, as much time will necessarily be occupied in the examination of the numerous credentials involved, and interviewing the selected candidates, prior to the final selection being made. Mr. Brown's notice does not terminate until the end of the year; but, by arrangement with the Committee, he has already relinquished the control of the works, and has left Nottingham. The office, therefore, has for several weeks been practically "in commission," the principal work being carried out under the direction of the Assistant-Engineer and the Chief Clerk; Councillor Albert Ball, the ex-Mayor and Chairman of the Gas Committee, exercising supreme personal control.

Mr. Brown, upon his appointment in 1902, was paid a commencing salary of £750 per annum, which has since been raised by instalments to £1000; and it is at the latter figure that the vacancy has now been advertised—the appointment carrying with it engineering and managerial control of the three gas stations and residuals works. Thus, for the present, the conditions attaching to the office are, in the main, those which obtained in Mr. Brown's case; but there are not wanting indications that a division of offices, and consequent responsibility, may eventually be decided upon. The idea is one which, though never yet acted upon, has been several times pressed seriously upon the attention of the Committee, who are free to take action in the direction suggested, as it is understood they may now probably do. The desirability of such a division was pointed out by the late Sir George Livesey, when, not long after Mr. Brown's appointment, he was called in to advise the Corporation as to the future conduct of the undertaking. But no action was taken. The proposal was revived by the Special Committee, presided over by Sir John Turner, who conducted, in October, 1906, an exhaustive private inquiry, arising out of certain acrimonious attacks made upon Mr. Brown. They expressed the view that it was not desirable that one official should have the entire management, and they recommended that the administration of the undertaking should be reorganized, by an engineer being appointed to take charge of the whole of the manufacturing

stations and plant, and with responsibility for the manufacture of gas and for the carbonizing results up to the point where gas is delivered into the charge of the distribution department; that he should be required to work in harmony with the manager, but have independent access to the Committee; and that a manager should be appointed to superintend the commercial portion of the work, the chemical industry arising out of the manufacture of residuals, the entire distribution department, and to advise also as to the installation of new plant. Supplementary to the existing methods of testing gas, the appointment of a gas examiner was at the same time recommended. No definite action followed upon the report of the Special Committee; but the outcome of a public inquiry in June, 1907, presided over by the present Town Clerk (Mr. J. A. H. Green), who was then Mayor of the City, was an emphatic endorsement of Sir George Livesey's earlier recommendation as to the division of the offices.

Though matters have since continued on the old basis, the new appointment indicates the probability of the suggestion referred to being again revived. The terms of the constitution of the Gas Committee are sufficiently wide to leave them entire control in the matter of the selection of Mr. Brown's successor. His appointment, as was that of his predecessor, was simply notified to the Council after it had been made; but, having regard to the somewhat fierce light which has of late years beaten upon the administration of the gas undertaking, it is regarded as not improbable that the Committee may on this occasion take the Council into their confidence before the appointment is finally ratified.

PUBLIC LIGHTING OF THE CITY OF LONDON.

New Scheme Approved.

At the Meeting of the Court of Common Council last Thursday, Mr. Swinstead asked the Chairman of the Streets Committee whether he could make any statement on the subject of the new lighting scheme for the City. Mr. Gunton replied that the matter was under consideration. It was hoped, however, to submit a full scheme at the next meeting of the Court. The scheme had been unanimously approved; and it would effect a saving of many thousands of pounds a year.

Referring to this matter, the "City Press" last Saturday made the following remarks: "After prolonged experiments and investigations, the Streets Committee of the Corporation have agreed upon what may be regarded as the final scheme of street lighting in the City. And it will be laid in detail before the Court of Common Council at an early date. We understand that the scheme provides for the use of both gas and electricity in almost equal proportions. As far as possible, the lamps will be centrally hung in a manner made familiar during the experiments. The type of gas-lamp finally selected by the Streets Committee, subject to the approval of the Common Council, is that to be seen at the King William Street end of Cannon Street. As regards electricity, the kind of lamp recommended is that to be seen at the St. Paul's Churchyard end of Cheapside. In streets where centrally hung lamps would be impracticable or inconvenient, resort will be had to brackets, except in cases where these, too, would be difficult to fix. Where it is not possible to have either suspended lamps or brackets, standards will be used; but every effort will be made to dispense with them within the bonds of possibility. These arrangements apply equally to gas and electricity. The doom of standard lamps will be sealed without any public regret; for standards, even when sightly, cause a great obstruction to pedestrians. Yet this is not the only consideration that has influenced the Streets Committee. If the scheme about to be submitted is carried into full effect, there will be an increase of nearly 50 per cent. in the illuminating power, and at the same time a saving of many thousand pounds a year in the cost of public lighting."

By a rather curious coincidence, the "Observer" last Sunday contained the following paragraph extracted from the number for Nov. 3, 1811: "The gas-lights are, we understand, to be extensively applied during the present winter in various parts of the Metropolis, under the provision of the Act of Parliament and Royal Charter." It is remarked, in a footnote, that gas was first used in the streets of London in 1807, but did not become general till some ten years later.

FATAL SHAFTING ACCIDENT AT BECKTON.

Last Thursday, an adjourned inquiry was held at the Public Offices, Barking, by Dr. AMBROSE, the Coroner for the Eastern Division of Essex, in regard to the death of Thomas Napier (48), a labourer in the employ of the Gaslight and Coke Company at Beckton. On Monday, the 23rd ult., about five o'clock in the afternoon, deceased was missed, and was subsequently found dead in one of the hopper-houses.

Mr. C. BEASLEY ROBINSON (Messrs. Monier-Williams, Robinson, and Milroy) attended on behalf of the Company; and Mr. J. N. Reeson, the Engineer-in-Charge at Beckton, was also present. Mr. C. F. Hunter, one of His Majesty's Inspectors of Factories, watched the proceedings.

William Brady, a fitter, deposed that about five o'clock on the day of the accident he was in No. 2 house when a coal trimmer came in and said he had not seen deceased for an hour-and-a-half. He and the coal trimmer commenced a search, and eventually in No. 1 hopper-house he saw some clothing revolving round the shafting. On looking on the ground, he found the deceased lying under the shafting; he was curled up, quite naked, and dead. Witness at once stopped the shafting and called for help. The shafting was about 4 feet from the ground; and it would be going at about 100 revolutions a minute. It was quite smooth. The pulling-lever was about 2 ft. 6 in. from the shaft. There was a guard at each end, but no protection at the middle of the shaft. The only reason a man would have for going to that part of the machine would be to pull the lever to start it. It was the duty of the deceased to attend to the lever.

By Mr. ROBINSON: The machine on either side was shielded, and was quite smooth. The deceased might have leant on the shaft; but he ought not to have done so. He (witness) could not account in any way for the clothing being caught. Deceased would have no occasion to go farther than where the lever was.

By Mr. HUNTER: In order to work the lever, the deceased would require to stand in a position parallel to the shaft, so that part of his body would be considerably nearer than 2 feet. There was a large gaslight there.

Shadrack Joslin, stage foreman, said he had to see that the machine was working properly; and he gave the deceased notice to start the hopper. He had been doing this kind of work for eight or nine months, and knew all about it.

By the JURY: Deceased would stand in front of the lever to pull it; and there was plenty of space for it on the shaft side. There was nothing to prevent him falling from the top of the shaft; but he would not do so unless he became giddy, or something of that sort.

John Neil, a lobby man, said the deceased came into No. 8 lobby about three o'clock on the day of the accident; and, so far as he (witness) could see, he had nothing on to catch on the shaft.

Dr. *John Guest* deposed that he was called about five o'clock on the 23rd ult. to No. 8 retort-house, where he saw the deceased, who had been dead about half-an-hour. The left leg and the right arm were fractured; and there were several superficial wounds on the chest. The spinal cord and the whole of the vertebræ were fractured; and this was the cause of death. He thought deceased must have fallen backwards, possibly through giddiness, because there were no wounds on the face.

The CORONER having summed up the case,

A JUROR said he thought there should be a caging over the shaft.

The CORONER: That certainly seems a reasonable thing. I understand something has been done since the accident.

The JURY, having briefly consulted, returned a verdict of "Accidental death." They also expressed the hope the Company would do something special for the widow and dependants of deceased, as they were all soon to start for Australia when the accident happened.

The CORONER said he was sure the Company would do everything possible.

Mr. REESON said he would report to the Directors of the Company the suggestion of the Jury.

The CORONER said he was informed that they had already arranged to give employment to those of the children of the deceased who were old enough to work.

BURY CORPORATION GAS-WORKS.

Visit of Inspection—Progress of the Undertaking.

On the invitation of the Chairman (Mr. S. Kay) and the Deputy-Chairman (Mr. Bradley) of the Gas Committee, members of the Bury Town Council, together with the heads of the various departments of the Corporation, recently paid a visit of inspection to the gas-works. On their arrival, the visitors were received by the Chairman, Deputy-Chairman, and the Engineer and Manager (Mr. H. Simmonds), and were shown the various processes connected with the manufacture of gas and the treatment of residuals. The inspection proved most interesting and instructive. At its close, an adjournment was made to the Board-room, where light refreshments were served.

The Chairman, on behalf of himself, the Deputy-Chairman, and the Manager, thanked those present for accepting the invitation, and gave some interesting particulars as to the development of the gas undertaking. Taking the years 1900 and 1911, he said the capital spent on the works up to March 31, 1900, was £259,000, and there had been paid off by the sinking fund £100,000; leaving a net debt of £159,000. The capital spent on the works up to March 31, 1911, was £327,363, and there had been paid off £186,000; leaving a net debt of £141,363, which was £17,637 less. The producing power of one works in 1900 was 2 million cubic feet per day; and in 1911 it was 3 millions. The revenue from gas and residuals in 1900 was £53,000; while in 1911 it was £65,600—an increase of £12,600. The average price of gas for the last ten years had been 2s. per 1000 cubic feet net for lighting, cooking, and heating purposes, and from 1s. 10d. to 1s. 6d. net for motive power; the added areas paying 9d. per 1000 cubic feet more. This year the price had been reduced 1d. all round. The profits made since 1900 had been £78,693, half of which had gone back to the consumers, and the other half to the relief of the rates. He thought they in Bury might congratulate themselves on not only having an excellent Manager but excellent works; and they would be able to hold their own even with the works at present existing.

A vote of thanks having been accorded to the Chairman, Deputy-Chairman, and Manager for their invitation, Mr. Bradley, in responding, said some of those present had never before been inside a gas-works; and therefore he was sure the visit would have been an education to them. Mr. Simmonds also acknowledged the vote. He said it had been a pleasure to him to conduct the members of the Corporation over their property. He said he had always been in favour of keeping down the capital account; and it was satisfactory to know that they were practically £17,000 and £18,000 less in capital than they were ten years ago, though their producing power was 50 per cent. more. Several speakers expressed satisfaction at the visit; and Mr. Simmonds acknowledged the services rendered by his staff.

Salford Corporation and the Appointment of a Water Engineer.—The Water Committee of the Salford Town Council have decided to appoint an engineer and manager to take charge of the Water Department. Mr. S. J. Dunn, who has for many years held the post as Superintendent, will relinquish this position at the end of the present month, and be henceforth engaged under the Finance Committee. Mr. Dunn was appointed Superintendent against his wish; and recent deaths have given an opportunity of rearranging the staffs without increasing the expenses of the Water Department. These changes have been confirmed by the Council.

ELLAND-CUM-GREETLAND GAS COMPANY.

Unveiling of Portraits of the Vice-Chairman and the Engineer.

An interesting ceremony took place at the close of a recent meeting of the Directors of the Elland-cum-Greetland Gas Company, when the Chairman of the Company (Rev. G. E. Aspinall, J.P.) unveiled in the Board-room at the Company's offices portraits in oil of Mr. Robert Thornton, J.P., Vice-Chairman, and of Mr. Robert Porter, the Engineer, Manager, and Secretary. The portraits had been hung as a mark of appreciation of services rendered to the Company. Mr. Thornton, who is just entering upon his third year of office as Mayor of Brighouse, was appointed a Director in 1881; and the Chairman referred to the constant care and attention he had devoted to the affairs of the Company to his knowledge for the last twenty-six years. Mr. Aspinall also mentioned Mr. Porter's appointment rather more than twenty-two years ago, and said the Directors felt it to be their duty to give tangible and permanent expression to their appreciation of the services he had rendered during this period. The very fact of the high price at which the Company's shares sold in the open market was an indication of how the general public appreciated the status of the Company for which the Manager had been largely responsible.

Mr. Thornton acknowledged the great pleasure it gave him to be honoured in the way he had been, and said it was always congenial to him to attend to the business of the Company, because it was so excellently managed, and also because of the pains taken by, and the unity of, the Board of Directors, which had led to such a satisfactory position being obtained by the undertaking.

The Chairman, on behalf of the Directors, also presented Mrs. Porter with a replica of Mr. Porter's portrait, and expressed the hope that he would have many more years of useful service with the Company.

Mrs. Porter, in acknowledging the gift, said it would be a great and lasting pleasure to her to possess so valuable a testimonial of Mr. Porter's services.

All the three portraits are by Mr. Arthur Hacker, R.A.

SOUTHAMPTON GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday, at the Company's Offices, Agle Road, Southampton—Captain A. J. Corse Scott, the Chairman, presiding.

The Secretary (Mr. J. R. H. Jacobs) having read the notice convening the meeting, the report of the Directors was presented. They stated that after payment of the debenture interest and other charges, the profit and loss account showed a balance of £15,154 available for distribution; and they recommended that the maximum dividends, less income-tax, amounting to £13,895, for the half year ended the 30th of June should be paid; leaving a balance of £1259 to be carried forward. They stated that the sale of gas for the six months showed a satisfactory increase; and better prices had been obtained for residual products. They mentioned that Mr. S. W. Durkin, the Resident Engineer and Manager, who had served the Company faithfully for nearly 59 years, resigned his position on the 30th of June, and was granted a suitable superannuation allowance. The Directors expressed their deep regret at having to announce his death on the 6th of September. They appointed Mr. Frank Durkin, who for many years was Assistant-Manager, as Resident Engineer and Manager. In recognition of the valuable services of the Secretary, the Directors recommended, for the confirmation of the stockholders, an increase in his salary.

The Chairman, in moving the adoption of the report and accounts, said this was the eighteenth time he had had the pleasure of doing this; and he must say that he never had greater pleasure than on the present occasion. The shareholders would see from the accounts that the profits for the half year enabled the Directors to pay debenture interest and other charges, to provide for the payment of the maximum dividends on the ordinary stock, and leave a balance of £1259 to be carried forward. As compared with the corresponding six months of 1910, the sale of gas showed the gratifying increase of 19¼ million cubic feet. This, he thought, was a strong proof that, notwithstanding fierce competition, the Company were still progressing. The premises, 81, Above Bar, which the Directors purchased early in the year, had undergone considerable alterations. The first portion was opened last month, and the remainder would be opened at a very early date. The Company would then possess one of the most up-to-date show-rooms in the Provinces; and consumers would be able to see the latest appliances for the varied uses of gas, and obtain expert advice thereon. The Directors anticipated that the show-rooms would be a great incentive to stimulate fresh ideas, and indicate new methods by which the comforts of a household might be increased. All this must be satisfactory to the shareholders. He now came to a more painful part of the report; and it referred to the loss the Company had sustained by the death of Mr. S. W. Durkin. After faithfully serving the Company for nearly 59 years—the last 34 years as Resident Engineer—Mr. Durkin tendered his resignation on the 30th of June last. The Directors granted him a suitable superannuation allowance; and it was with deep regret they had to record his death on the 6th of September last. Thus he only lived a few months to enjoy his well-earned superannuation. Mr. Frank Durkin, who had been Assistant-Manager to the Company for many years, was appointed Resident Engineer and Manager. The shareholders would recollect that new stores and workshops were in course of erection when they last met, and these were now occupied and in use. The possession of these premises would enable the work in connection with the outdoor departments of the Company to be dealt with more expeditiously. The Directors had recently inspected the works, and found them in excellent order. They had been constructed under the advice and supervision of Mr. Joseph Cash, and were well worthy of inspection. He now came to the portion of the report which stated that, in recognition of the valuable services of the Secretary, the Directors recommended an increase in his salary. He might say that since Mr. Jacobs had been the Secretary he had introduced many improvements, and had worked hard for the Company, and in a way which he was sure would secure its future progress. Before he sat down, there was one matter to which he should refer—namely, the wages of their employees, which had had the serious consideration of the Directors for the past three months. It was a question which had affected other gas companies, as well as railway companies, and he was glad to state that the Board had been able to give an increase in wages to the majority of the workmen in their employ.

The Deputy-Chairman (Mr. J. C. Moberly, M.A.), in seconding the motion, said they welcomed Mr. Durkin in his new position as Resident Engineer and Manager; and he wished to associate himself entirely with all the Chairman had said with reference to the Secretary.

The motion was carried unanimously; and the maximum dividends were declared.

It was then resolved, *nem. con.*, that the salary of the Secretary should be increased by £100 per annum.

Mr. Jacobs, in returning thanks, said that since he had been in Southampton he had done his very best for the interests of the Company, and he had been backed up by a loyal staff, who were always ready to do what they could for the success of the undertaking.

Votes of thanks were accorded to the Chairman and Directors, and the Manager, Secretary, and staff, and the proceedings closed.

WELSBACH LIGHT COMPANY, LIMITED.

A Formal Meeting.

In order to comply with the Articles of Association and statutory obligations, a formal meeting of the shareholders in the Welsbach Light Company, Limited, was held at Winchester House, Old Broad Street, E.C., last Wednesday. In the circular calling the meeting, it was pointed out by Mr. S. J. Endersby, the Secretary *pro tem.*, that the Company was incorporated on May 6 last, and the financial year does not close until March 31 next, so that no accounts or balance-sheet would be available for presentation at the meeting. Such accounts, however, made up to March 31, would be presented to the annual general meeting to be held as soon after that date as might be convenient.

The meeting on Wednesday last was presided over by Sir Edwin Grant-Burls, C.S.I., the Vice-Chairman of the Company; and he remarked, in opening, that it was obvious that the accounts and the report of the Directors on the year's transactions could not be presented at a meeting held when only about six months of the year had expired. Therefore the only business before the meeting was to elect the Auditors and to defer the presentation of the accounts and balance-sheet until after the close of the Company's financial year. A few days ago, the "Financial Times" had expressed the hope that he might be able to make an anticipatory statement with regard to the business for the year. ("Hear, hear.") This might seem a reasonable request; but as practically the Company's busy time only commenced about the middle of October, and as he happened to be no prophet, it would be absolutely impossible for him to make any statement which might not be misleading. This being so, he preferred to make no statement at all.

It was then agreed, without discussion, on the motion of a shareholder, that Messrs. Deloitte, Plender, Griffiths, and Co. be re-elected Auditors until the next ordinary general meeting, and that the remuneration be at the rate of 200 guineas per annum.

The Chairman moved the second resolution, to the effect that the presentation of the accounts and balance-sheet be deferred until after the close of the Company's financial year. This having been duly seconded, Colonel Ranken inquired whether the accounts for the past year had been audited. The Chairman remarked that the question referred to another Company; and personally he knew nothing about the matter—he had no official knowledge on the subject. It seemed to him that it was a question for the Liquidator of the old Company; and he was afraid it was not in order at the present meeting. Colonel Ranken then suggested that Mr. Laurence Fletcher might answer it; but Mr. Fletcher said he did not think he would be in order in replying to the question. The Chairman pointed out that the business before the meeting was the affairs of the new Company, and not of the old one. Colonel Ranken retorted that at the meeting last August the Chairman promised another meeting in December at which all questions and all discussion regarding the Company would be in order. Why, he asked, was the date of the meeting put forward, and why was the discussion of matters which certainly affected the interests of this Company ruled out of order? The Chairman said his answer was, as to the anticipation of the date of the meeting, he named December because he thought it was going to be that month; but it happened to be more convenient to hold it in November. They could only discuss what was set forth in the notice. The question regarding the assets to be taken over by the present Company, they had no knowledge of. At this point, the discussion was taken up by Mr. Walker, who remarked that he felt the new Company was beginning in a way which was not in the best interests of the shareholders and the Board. They had a new Chairman, who had had nothing to do with the affairs of the old Company. He also thought Mr. Fletcher was perfectly right in refusing to answer the question put to him. He might have been asked if he would give his opinion as to how matters were going on; but he had been more or less catechized. The way in which the questions had been asked was not, he thought, treating the present Board in the fair spirit to which they were certainly entitled. This statement caused Colonel Ranken to say something about authorized spokesmen of the Board—a remark warmly resented by the Chairman.

A part in the proceedings was also taken by Mr. R. H. Green, who inquired whether it was true that the meeting had been put forward to enable one of the Directors to attend the Durbar. If so, for how long did this gentleman propose to absent himself from the business of the Company, and did the Board propose to pay him for his services during his absence? The Chairman replied to this that the fixing of the date

of the meeting had nothing whatever to do with the absence of Mr. Crompton-Roberts, who would probably be away about three months, and would be paid his fees during that time. "It is," concluded the Chairman, "too early to say how the Company is going on. In justice to ourselves, you must give us a little time."

The passing of the second resolution, as already mentioned, terminated the business before the meeting.

BARRY GAS AND WATER UNDERTAKINGS.

Price of Gas Reduced.

The Barry Gas and Water Committee had before them on Monday of last week the report for the year ending March 31 of Mr. T. E. Franklin, the Gas and Water Engineer and Manager. Considerable time was occupied in the discussion of it; and he was congratulated by several members upon the excellence of the report.

Dealing with the Gas Department, Mr. Franklin showed that for the year 1910-11 the gross profit was £17,034, as compared with £14,846 for 1909-10, and £12,557 for 1908-9. The net profit for the past year reached the total of £8367, which was an increase of some £2245 over the previous year, and of £4448 over 1908-9. The capital account showed an increase in the amount spent of £665. Gas sales exhibited an increase of more than 3 per cent.—namely, 5,269,238 cubic feet—over the previous year. More coke, breeze, tar, and ammoniacal liquor were sold. Expenditure on coal had decreased from £9098 to £8639; while the quantity carbonized was increased by 344 tons.

Gas sold per ton in	1907–8	was	9227	cubic feet.
,, ,,	1908–9	,,	9782	,,
,, ,,	1909–10	,,	10,291	,,
,, ,,	1910–11	,,	10,404	,,

Owing to the increase in the amount of gas sold, the income from gas-rentals increased from that of the previous year by £956; while the increment in the revenue from residual products amounted to £883. The total amount standing to the credit of the reserve fund on March 31 was £3852. Capital charges were still high, and amounted to 12·83d. per 1000 cubic feet sold. Thus over 30 per cent. of the total revenue from gas-rentals was utilized each year in repayment and interest on borrowed money.

Turning to the Water Department, Mr. Franklin said there was an increased capital expenditure of £272. The sum expended on the maintenance of mains, meters, &c., showed a decrease of £121. There was an increase in the receipts from water-rentals of £170. The gross profits showed an increase of £330, and the net deficiency was lower by £332 than that of the previous year; being now only £2036—the lowest figure since 1896-7.

Summarizing the results, he showed that, taking the net profit on gas as £8367 and the net deficit on water as £2036, there was a net surplus shown on the year's working of £6331. He gave at the end of his report a summary of the results of the working of the undertaking since 1898, and showed that what was a net deficiency on the combined undertakings of £1397 in 1898 had in 1907 been turned to a surplus of £619; and since 1906 there had been increasing contributions placed to the gas reserve fund, and £100 each year (with the exception of 1909) to the water reserve.

In opening the discussion, Mr. Griffiths said that, while he did not want to frighten the Committee, as a result of visits which he had paid to several other works, he was certainly of opinion that they could spend £30,000 profitably on their own works at Barry, to bring them up to date. At Barry all the retorts were working every day; but there should be spare retorts, and these would, he estimated, cost £14,000. Then, again, they wanted new scrubbers, washers, and condensers, as the present ones were out of date; and these would cost another £2000. In addition, he mentioned a new coke-conveyor, and other various improvements, which brought the total up to the £30,000. The Chairman (Mr. J. T. Hogg) intimated that, after the placing of £1000 to the gas reserve and £100 to the water reserve, the Council had appropriated several thousand pounds to the relief of the rates; but there was still an amount of £1640 left unappropriated. This the Committee eventually decided to add to the gas reserve fund for renewals, bringing it up from £3800 to £5400.

Later in the evening, on the motion of Mr. Jones, seconded by Mr. Watson, it was decided to reduce the price of gas, as from Jan. 1 next, from 3s. 4d. to 3s. per 1000 cubic feet. This Mr. Griffiths estimated would take £2800 out of the estimated profits. It would mean a reduction of 9d. per 1000 cubic feet since Jan. 1, 1908. It was further decided to consider what were the most important renewals and repairs required at the gas-works, and also to discuss the advisability of increasing the Gas Engineer's salary.

THE DURATION OF OUR COAL SUPPLIES.

The remarks made by the President of the British Association (Sir William Ramsay), in the course of his address at the meeting of the Association at Portsmouth in August, on the probable duration of our coal supplies, continue to attract attention.

Questions in Parliament.

In the House of Commons a few days ago, Mr. G. A. Touche, the Member for North Islington, asked the Home Secretary whether his attention had been directed to the warning uttered by the President of the British Association concerning the exhaustion of the coalfields of this country; and whether the Government anticipated taking any steps tending to the conservation and lessened waste and export of this source of energy supply, having regard to the extent to which the nation's commercial position and the support of the industrial population are dependent upon it.

Mr. M'Kenna, in reply, said he had seen a report of the address referred to; but he observed that the President's forecast of the probable duration of the coal supplies of the country did not take into consideration certain factors which have an important bearing on the question. In the first place, his estimate took no account of the large amount of coal in fields unproved at the time of the inquiry by the Royal Commission, nor of the amount of coal lying below the depth of 4000 feet, which the Commission took to be the present limit of workable coal, but which it might be found possible hereafter to exceed. These two sources the Commission estimated at upwards of 39,000 and 5000 million tons respectively, or together nearly half as much as the amount of coal estimated to exist in the proved coalfields. In the second place, the President's estimate was based on the assumption that the output of coal would continue, at all events for some time, to increase at the same rate as in the past. The Commission, on the other hand, considered that at a time not far distant the rate of increase of output would become slower, to be followed by a period of stationary production, and then a gradual decline.

With regard to the second part of the question, Mr. M'Kenna said no recommendation was made by the Royal Commission, who reviewed the whole subject at length, as to any action with a view to prevent waste in the working and use of coals. The suggestion which Sir William Ramsay was reported to have made, that Parliament should impose a penalty on wasteful expenditure of energy supplies, would involve an amount of control over the industries of the country which, under present conditions, it would be impossible for any Government to undertake. The Commission looked forward to the introduction of considerable economies in the future; and he was advised that, both in the working and in the using of coal, progress was being made in this direction.

As to the question of the export of coal, the Commission reported that the witnesses whom they heard were generally of opinion that "the maintenance of a large coal export trade is of supreme importance to the country and essential to the prosperity of the coal-producing districts;" and the Commission saw "no present necessity to restrict artificially the export of coal in order to conserve it for our home supply."

The honourable member was not altogether satisfied with the Home Secretary's reply, as last Wednesday he placed on the paper a notice of his intention to ask him whether, in view of the increase in coal consumption during the last forty years, and of the circumstance that, in any event, the duration of the known and workable fields is limited, and their exhaustion at the present rate of consumption can be approximately determined, the Government are satisfied to rest on the opinion of the Royal Commission that the rate of increase in output would become lower, remain stationary, and then decline, as affording sufficient ground for assuming that no steps are necessary for the conservation of this source of energy, instead of regarding it as an indication of increasing difficulty in maintaining the supply; or, having regard to the vital national importance of the supply of industrial energy, whether the Government will consider the suggestion of Sir William Ramsay that a small Commission should be appointed, sitting permanently, to inquire and keep the Government advised from time to time as to the rate of exhaustion and probable further duration, and as to what, if any, steps should be taken, in the light of further knowledge, to conserve and utilize the remaining supplies to the best advantage of the nation.

Sir William Ramsay's Reply.

In a letter to "The Times" last Thursday, Sir William Ramsay replied as follows to the Home Secretary's first answer to Mr. Touche:

Mr. M'Kenna, the Home Secretary, has done me the honour to make some remarks on my estimate of the duration of the reserve of coal in Great Britain. The object which I had in view in my presidential address to the British Association was to point out that it is exceedingly unlikely that any other source of heat or power will be discovered which will supplant coal; and that it is therefore incumbent on us to take every means in our power to prevent waste of coal. To this, I am sure that Mr. M'Kenna would agree. He points out, however, that I do not take into consideration the large amount of coal in fields unproved at the time of the inquiry of the Royal Commission, nor the coal lying at a depth greater than 4000 feet, which the Commission estimated at over 44,000 million tons more. He also quotes the opinion of the Commission that at a time not far distant the rate of increase of output would become slower, to be followed by a period of stationary output, and then a gradual decline.

In criticism of this last opinion, I can only point to the increase of consumption during the last forty years. [Sir William gave a diagram which clearly showed that there is no decline in this rate, but that, on the whole, it is increasing.] Granting that our reserve were 200,000 million instead of 100,000 million tons, it would increase the limit of the duration of our supply to about 270 years, instead of the 175 years suggested in my address. This in no way alters my argument that the conservation of our coal reserve is a national question, and should at once claim the attention of our legislators.

Mr. M'Kenna is mistaken in supposing that I recommended the imposition of a penalty on wasteful expenditure of energy supplies. I merely stated that this is one form of legislation which would lessen the squandering of our national resources. The other is the plan of advancing loans at an easy rate of interest to enable reforms to be carried out; and all I urge is that immediate action should be taken, for the problem is a complicated one, and it will demand the combined efforts of experts and legislators for a generation.

It was thought by many, at the close of the labours of the Coal Commission, that steps should have been taken to ensure continuity in investigating the consumption of our reserves of energy; and I again venture to urge that a small Commission should be appointed, sitting permanently, to report to and to advise the Government as to the rate of exhaustion of our energy supplies, and as to what, if any, steps should be taken to minimize that rate. The United States, with a much larger coal reserve, as well as an oil supply, which we lack, have not thought it unnecessary to take means to keep abreast with the diminution of their sources of energy.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

It was a favour which was conferred upon the Western District of the Scottish Junior Gas Association to-night when Mr. J. Grant, of the Meter Department of the Glasgow Corporation, read a paper on the subject of prepayment meters. Readers will be interested to learn of the enormous number of ordinary meters which are converted into prepayment meters in Glasgow, and that the process of conversion is confined very largely to 2-light meters. There are at present more than 60,000 prepayment meters in Glasgow. Mr. Grant's work, in what is described as the largest meter-repairing department in this country, entitles him to give an opinion upon the working of meters; and it is refreshing to find that he is not slow to rest opinions upon his experience, whether these be upon the method of working the meters or the extra amount charged where prepayment meters are supplied. His opinions, we may be sure, will have all the more weight in that they are given with candour, and are supported by reasons.

At the monthly meeting of the Edinburgh and Leith Gas Commissioners on Monday of this week, presided over by Provost Smith, of Leith, a petition signed by 237 out of 244 workmen employed on the nine-hours day at the Granton Gas-Works was considered. The men asked that work on Saturdays should stop an hour earlier than at present; and they offered to rearrange their meal times so that the hours of labour should not be curtailed. The Engineer, Mr. A. Masterton, reported favourably on the proposal, with certain modifications. The Commissioners granted the petition. A Sub-Committee reported that during the year 2245 tons of sulphate of ammonia were sold, realizing £27,976—an average of £12 9s. 3d. per ton net and naked in buyers' bags at the works. In the course of the year, the prices at which the material was sold were as follows: November-March, £11 17s. per ton; April, £13 8s.; June, £12 5s.; August, £13 10s.; and September-October, £13 8s. 4d. It remains at the maximum figure at the present time; and it is anticipated that the market is likely to remain steady for some period. Coke had been sold locally during the year at the works, for land orders, at 9s. 6d. per ton. For shipping orders, in the early part of the year, the market was a little slack; and some contracts were entered into at 9s. 3d. and 9s. 4d. per ton at the works. By May, however, they were able to obtain 9s. 6d.; and the market had again hardened up to about 9s. 9d. for shipping orders. During the year to date, 35,000 tons had been disposed of for shipment, and 30,000 tons for local orders. The average price realized all over had been 9s. 6d. per ton. The Finance and Law Committee reported that, on the advice of Counsel, appeals had been taken to a higher Court against the decisions in the Edinburgh and Leith Valuation Courts, as to the reduction of the landlords' proportion of rates and taxes.

Very little of interest has come under my notice in connection with the municipal elections which are at the present moment in full swing. In Dumfries, Judge Thomson, who is Convener of the Gas Committee, was asked if it was the case that consumers of gas using prepayment meters paid 6d. per 1000 cubic feet more than ordinary consumers. He replied that they were aware that the prepayment meter cost more, and that more labour was required in collecting the money. During the year, the gas cousumption in Dumfries was about 100 million cubic feet. Prepayment meter consumption was about 17 million cubic feet. He took it for granted that the working classes burned 50 million cubic feet of the gas. If people who used prepayment meters got them free, it would be necessary that the gas used by others, including the working classes, should be charged for at a higher rate. He had struggled hard to bring down the price of gas; and next year he hoped they would have it down to 2s. 6d. per 1000 cubic feet. When they had reached this figure, he would be in favour of doing away with all restrictions upon the use of gas and of supplying cookers free. He was agreeable to an inquiry being made into whether prepayment meters were unduly charged for or not. If on inquiry it was found they were charged too much, he was in favour of reducing the figure.

In the Arbroath election, Provost Alexander devoted his remarks to explanations with reference to the gas undertaking—doing so, he said, because the Town Council were about to apply for a Provisional Order for the purpose, among other things, of reducing the illuminating power of the gas. Though they wanted to reduce the gas from 20 to 14 candle power, they did not intend to make gas of the latter power. They simply wanted to give the consumers gas the coal would produce, which was from 17 to 18 candle power.

The difficulties which small places have to face were illustrated by Provost Shand, in addressing the electorate of Old Meldrum. He said they had reduced the price of gas during the past year 25 per cent., and had tried to impress on every householder the need for using it. The distillery had stopped working; and as they were large users of gas, it was found impossible to meet liabilities. The price was now 7s. 6d. per 1000 cubic feet; and he thought it very unfair and unpatriotic of some of their largest houses in the burgh not to make use of it. The Council feared that they would have to impose a tax for the gas this year; but there would be no rate imposed after all, as they were most unwilling to introduce a new rate. After consideration, they had decided to appropriate the local taxation grant to meet the shortage on the gas, and this was the reason for the increase of 2d. on the burgh general rate.

On Wednesday, the annual meeting was held of the Turriff Gaslight Company, Limited, at which it was agreed to pay a dividend of 5 per cent., free of income-tax, and to carry forward £196.

A fortnight ago, reference was made in these "Notes" to the inauguration of a new spiral-guided gasholder which had been erected at Leven; but an incident which occurred in the course of the proceedings was not taken notice of. This was where Provost Balfour, of Leven, stated that the previous week he had met Sir James Scott, of Tayport, who informed him that in his burgh simultaneous lighting of the street-lamps had been installed by Messrs. Alder and Mackay, with most satisfactory results. At a quarter to six in the morning Tayport was now, in winter, suddenly and brilliantly lighted, enabling

Weighed in the Balance

And Found Wanting

in all the NON-ESSENTIALS of Radiator construction.

The "Steamless" requires NO WATER or liquid of any kind, and is devoid of the DRAWBACKS attendant thereon.

It is NOT COMPLICATED by gauge-glasses and valves, and, after lighting, requires NO ATTENTION.

There is NO FLAME CONTACT—hence Perfect and Complete Combustion.

Davis's Steamless Radiator.

But Fully Equipped

to stand all Maintenance tests to which it can be subjected.

It affords ABSOLUTELY UNIFORM HEAT DISTRIBUTION at low cost to Gas Company and Consumer alike

As well as an INCREASED EFFICIENCY rendered possible by its Unique and patented Construction.

EXTREME SIMPLICITY and a definite GUARANTEE are features which render the "Steamless" DIFFERENT FROM ALL OTHERS.

The Davis Gas Stove Co., Ltd., Luton.

workpeople to get comfortably to the various mills, and the light was kept on until a quarter past six, for the benefit of late-timers. Then the light was withdrawn. Sir James Scott informed him that the slight quantity of gas burnt during the day had no perceptible effect on the meter, but had the great advantage of maintaining the mantles in equable heat, and preventing their constant destruction. The town of Leven, with its usual generosity, had given free passage to the Gas Company's pipes; and he thought that, in return, the Company might institute that vast improvement at their own expense.

Mrs. Melvin, the wife of the Provost of Turriff, last Wednesday performed the ceremony of turning the key at a new reservoir at Barnyards of Delgaty, which has been constructed in order to ensure a safe supply of water to the town. These works constitute about the most enterprising piece of water-works policy that has ever been disclosed in connection with small communities. The Town Council first purchased outright the whole of the gathering-ground for the water; the seller being the Duke of Fife. Having thus safeguarded their rights in the water, they proceeded to the construction of the works which have now been completed at a cost of about £4500. The Engineer was Mr. W. D. Ironside, of Aberdeen; and the Contractor was Mr. J. D. M'Connachie, of Huntly. After the ceremony of turning on the water, a dinner was held in the Municipal Buildings, at which Provost Melvin presided, and a number of congratulatory toasts were honoured.

CURRENT SALES OF GAS PRODUCTS.

[For Table of "Tar Products Prices," see p. 411.]

LIVERPOOL, *Nov.* 4.

Sulphate of Ammonia.

Throughout the week there has continued to be a quiet tone in the market; but, in spite of this fact, the present increasing production has found an outlet without occasioning a set-back in prices. Although some of the dealers have been more anxious to dispose of their holdings, and are reported to have accepted rather less money, the closing values remain unchanged at £14 3s. 9d. to £14 5s. per ton f.o.b. Hull, £14 5s. to £14 6s. 3d. per ton f.o.b. Liverpool, and £14 6s. 3d. to £14 7s. 6d. per ton f.o.b. Leith. For future delivery there has again been little activity displayed; the check in the advance in prices in the near position no doubt acting as an incentive to buyers to await developments before committing themselves to the level now attained.

Nitrate of Soda.

There is no alteration to record in this article, and the quotations are repeated at 10s. 1⅛d. per cwt. for 95 per cent. quality and 10s. 4½d. for 96 per cent. quality, on spot.

LONDON, *Nov.* 6.

Tar Products.

The markets for tar products remain very strong. There has been a fair amount of inquiry for pitch during the past week, and in some quarters better prices are reported to have been paid. Benzols are steady for prompt delivery, but lower sales are announced for forward delivery. Creosote remains very firm; and for both prompt and forward delivery the inquiry is good. Solvent naphtha is very firm; and heavy naphthas are steady. Crude carbolic acid is strong for prompt delivery; but business is difficult to negotiate for forward.

The average values during the week were: Tar, 22s. to 26s. *ex* works. Pitch, London, 40s. 6d. to 41s.; east coast, 40s. to 40s. 6d.; west coast, Clyde 39s. to 39s. 6d.; Manchester 38s. 6d. to 39s.; Liverpool 39s. to 39s. 6d. Benzol, 90 per cent., naked, London 9¼d. to 10d. f.o.b.; North, 9¼d. to 9½d. f.o.b.; 50-90 per cent., naked, London, 8d. to 8⅛d.; North, 8d. to 8⅛d. f.o.b. Toluol, naked, London, 9d. to 9¼d.; North, 8¼d. to 8½d. Crude naphtha, in bulk, London, 4¼d. to 4⅜d.; North, 3¾d. to 4d. Solvent naphtha, naked, London, 9⅜d. to 10d. f.o.b.; North, 8⅜d. to 9¼d. f.o.b. Heavy naphtha, naked, London, 10d. to 10⅛d. f.o.b.; North, 9d. to 10d. f.o.b. Creosote, in bulk, London, 2⅞d. to 3d.; North, 2⅜d. to 2½d., salty; 2⅛d. to 2⅜d., liquid. Heavy oils, in bulk, 3d. to 3¼d. Carbolic acid, casks included, 60 per cent., west coast, 2s. to 2s. 2d.; east coast, 2s. 1d. to 2s. 3d. Naphthalene, £4 10s. to £10; salts, 45s., bags included. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article remains very firm, and there is a fair inquiry. Actual Beckton is still quoted £13 16s. 3d. Outside London makes are £13 10s.; Hull, £14 3s. 9d.; Liverpool, £14 5s. to £14 6s. 3d.; Leith, £14 7s. 6d.; Middlesbrough, £14 3s. 9d.

Gas-Works Extensions at Tipton.—The Tipton Urban District Council, on the recommendation of the Gas Committee, have decided to borrow £10,000 for the extension of the gas-works.

Girls' Cookery Competitions at Port Elizabeth.—We learn from a copy of the "Port Elizabeth Advertiser" just to hand that the girls' cookery competitions lately arranged for by the South African Lighting Association, Limited, have this time eclipsed all previous displays, both in the quality and quantity of cakes sent in. This is evidence of the great improvement which has taken place in the cookery classes held under the School Board, and more especially the trouble taken in this matter by Miss Hopkinson, the Cookery Demonstrator; most of the prize winners having been taught by her. There were 85 sets sent in; and the two ladies who kindly acted as Judges had a difficult task in awarding prizes, as there were so many cakes of nearly equal merit. The youngest competitor, who was not quite five years old, sent in four fine sets of cakes, and one set made in a paper bag (the latest novelty); and a special prize was given to her. The cakes were on view in the show-rooms of the Association; and they showed what could be done by young children with the aid of a gas-stove. The work was all so good, and as a slight encouragement to the young cooks, the Association's Manager, Mr. W. Arnott, decided to give all competitors a small enamel brooch.

R. & J. DEMPSTER, Limited,

OLDHAM ROAD,

MANCHESTER.

IMPROVED STILLS

FOR

SULPHATE OF AMMONIA

FITTED WITH

Patent Lime Agitators and Removable Side Plates for easy cleaning.

OVER 60 RECTANGULAR STILLS AT WORK.

WRITE FOR PARTICULARS

COAL TRADE REPORTS.

Northern Coal Trade.

The demand is full in the northern coal trade; and there is a heavy shipment in progress, which would be bigger if there were more steamers available. Best Northumbrian steams are from 10s. 9d. to 11s. per ton f.o.b.; second-class steams are from 9s. 9d. to 10s. 3d.; and steam smalls are easier at 4s. 10d. to 6s. The collieries appear to be working well; and it is only for forward sales that there are quotations much below those given above. In the gas coal trade, there is a strong demand, and the prices are firm, in spite of the high rates for carriage that are quoted to the southern ports. Best Durham gas coals are from 11s. 6d. to 11s. 7½d. per ton f.o.b.; second-class kinds are from 10s. 3d. to 10s. 6d.; and for "Wear specials," the quotation is from 11s. 8d. to 11s. 10d. There are inquiries for cargoes of gas coals for some of the Mediterranean ports; but with the current freights higher, and the tendency to higher prices for coal, about 20s. per ton is now quoted for cargoes of best Durham gas coal at Genoa—a rate that may have to be paid for a few cargoes, but one that buyers hold off from for forward contracts. Coke is steady. The increasing output of gas coke seems to be well taken up. Good gas coke is from 14s. 3d. to 14s. 9d. per ton f.o.b.

Scotch Coal Trade.

Trade continues very active; the demand for all classes being fully maintained. The prices now quoted are: Ell, 10s. 6d. to 11s. per ton f.o.b. Glasgow; splint, 11s. 6d. to 11s. 9d.; steam, 9s. 9d. to 10s. The shipments for the week amounted to 329,113 tons—a decrease upon the preceding week of 31,547 tons, but an increase upon the corresponding week of 18,772 tons. For the year to date, the total shipments have been 13,680,925 tons—an increase upon the corresponding period of 133,380 tons.

Cost of Impure Water.—In the number of "Engineering" for the 9th of June last, there was an article under this title, calling attention to the very high death-rate in American cities due to typhoid fever, caused by the distribution of impure water. Our contemporary has since learnt of the striking effect of filtration of water, which shows with what certainty the present death-rate can be reduced by the construction of filter-beds. In 1906, when Cincinnati was still using unfiltered water from the old works, there were 239 deaths from typhoid fever. The total for the three years 1904-6 was 667 deaths. In 1908, the year following the installation of the new water-works, which cost £2,400,000, the number of deaths dropped to 67. In 1909, there were only 45 deaths, and in 1910 only 21; the total for the three years being 133. The number of lives saved, therefore, was 531; the death-rate last year being 5·7 per 100,000 people. There is in addition a financial saving, as the old water-works cost £6 8s. per million gallons for pumping, while the cost of the new system is only £2 12s.

Theft from a Gas-Meter at Margate.

At the Margate Borough Police Court last Wednesday, before the Mayor (Mr. W. B. Reeve) and a Bench of Magistrates, Percy Terry, a boy of fourteen, was charged with having, on the 23rd ult., stolen 3s. 9d. from a prepayment gas-meter. Charles Epps, a collector in the employ of the Isle of Thanet Gas Company, deposed to finding the lock of the meter had been tampered with and the money-box empty. Albert Edward Nutley, a boy ten years of age, stated that he saw the prisoner on the evening of the above-named day, and went with him to buy some fireworks. Terry had a lot of money which he told witness he had taken out of a gas-meter. A constable deposed to arresting Terry in consequence of information he had received; and said that at the police station the boy confessed, in the presence of another constable, that he had opened the drawer of the meter and taken out money. He pleaded guilty to the charge, and the Magistrates remanded him to the Minster Union, pending his removal (subject to medical examination) to a training-ship till he is nineteen. The Company have for some time been troubled by lads injuring their prepayment meters; and the sentence on the one just captured will, it is hoped, act as a deterrent to others.

Gas-Main Extensions at Darwen.—At the meeting of the Darwen Town Council on Monday last week, Alderman Carus referred to the recommendation of the General Purposes Committee to borrow £3600 for an extension of gas-mains. He said he was opposed to the borrowing of this money, and suggested that they should pay for the new mains out of revenue as they required them. Mr. Duxbury proposed that the minute be deleted. He asked what they were going to do with the profits which were being made by their gas-works. He said there was no necessity to borrow money from the Local Government Board; and at the inquiry he would oppose the application. The Mayor said the transferring of money from revenue was a practice which should not be followed until they knew what their profits realized. The proposal to delete the minute was lost.

Additional Water Storage for London.—As recorded in another part of the "JOURNAL," a large reservoir which has been constructed by the Metropolitan Water Board to hold 900 million gallons was brought into use last Saturday. It may be remembered that the Board are building a very much larger one, to hold 3000 million gallons, at Chingford; and it will be opened early next year. Since the commencement of its construction in April, 1908, the contractors (Messrs. Charles Wall, Limited) have employed some 1200 men on the work; while a number of steam navvy excavators and large electric travelling "grabs" have been used. The area of the reservoir will be 416 acres; while the length of the embankment round it will be 4½ miles. The total cost of the reservoir, pumping machinery capable of raising 200 million gallons of water a day, and other works, will be nearly £600,000.

GAS-HEATED RADIATORS

should always be assembled with

MALLEABLE PUSH-NIPPLES

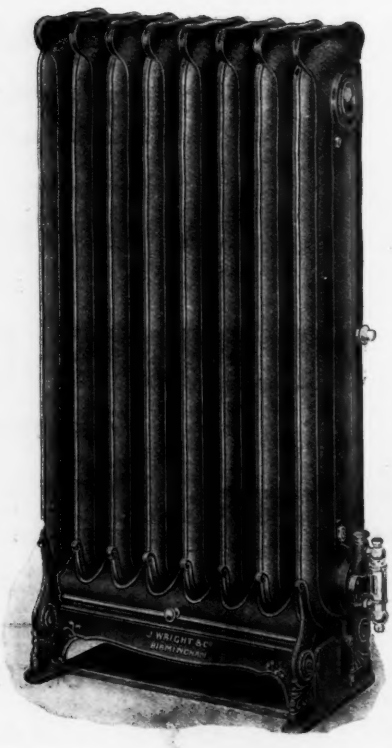
Any other joint is unsatisfactory.

STEEL PUSH-NIPPLES

are proved by experience to corrode in a

FEW YEARS.

28.



THE "ST. ANDREW"

GAS-HEATED

STEAM RADIATOR

is assembled with

MALLEABLE PUSH-NIPPLES

making a perfect metal-to-metal joint.

JOHN WRIGHT CO., Essex Works, BIRMINGHAM.

EXPERT ADVICE
Free of Charge.

The Chief of our Hot-Water Department is always prepared to do all in his power to afford assistance to Gas Officials in connection with Heating by Hot-Water or Gas-Steam Radiators.

ADDRESS:

JOHN WRIGHT & CO.,
Hot-Water Department,
19 & 21, Queen Victoria St.,
LONDON, E.C.

Derwent Valley Water-Works.

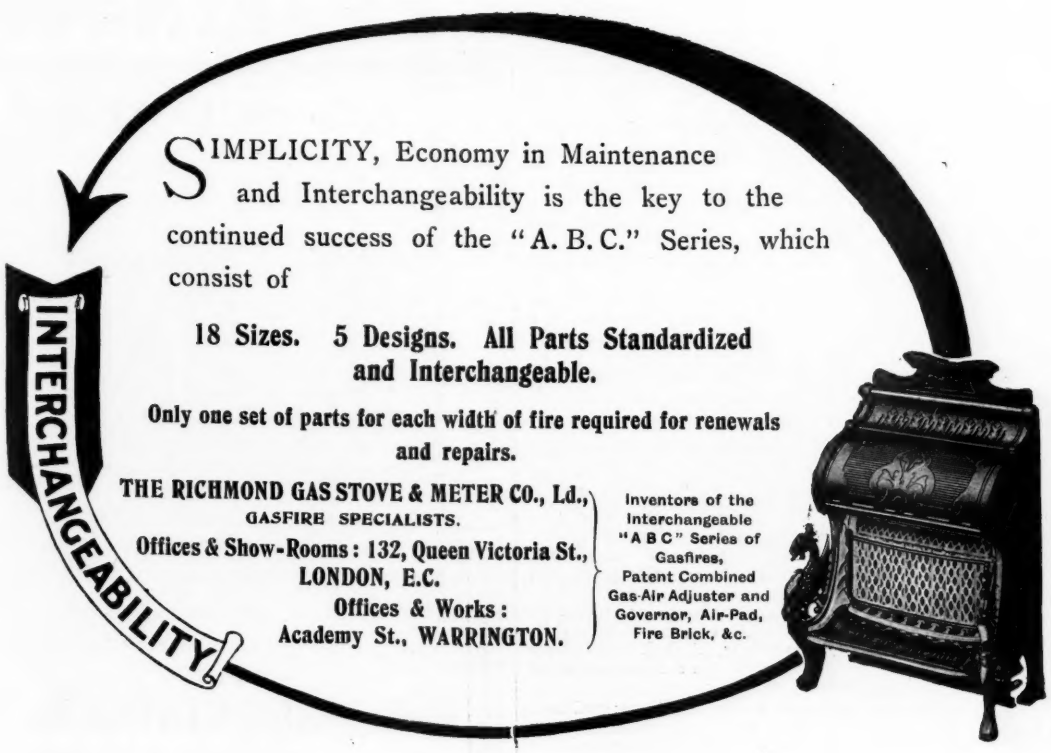
It is anticipated the formal opening of the Derwent Valley Water-Works may take place next June or July; and efforts have been made to get His Majesty the King to consent to perform the ceremony. The works—in which Sheffield, Leicester, Nottingham, and Derby are partners—have been in progress eleven years. The scheme includes the construction of five reservoirs for impounding the waters of the Rivers Derwent and Ashop, the construction of about 100 miles of aqueducts for distributing the water to the various authorities, about 20 acres of filter-beds at Bamford, and a service reservoir at Ambergate. At present only the Howden and Derwent reservoirs are required; and these are nearing completion. The Howden reservoir will have a capacity of 1886 million gallons, and the Derwent reservoir a capacity of 2000 million gallons. Both dams are more than 1000 feet long, over 100 feet above the river bed, and 176 feet thick at the bottom. The stone for the dams has been obtained from Grindleford. Of the 33½ million gallons of water anticipated to be the total quantity available for supply purposes from the complete scheme, Sheffield is entitled to 6·8 million gallons per day, Derby to 6·8 million gallons, Leicester to 9·8 million gallons, Nottingham to 3·9 million gallons, Derby County to 5 million gallons, and Notts County to 1 million gallons. To bring the Sheffield supply from the Derwent Valley, the Rivelin water tunnel is being cut under the hills.

At a meeting of ratepayers held prior to the municipal elections at Bolton last week, Mr. Joseph Taylor, of Messrs. Joseph Taylor and Co., the representative of the Deane-cum-Lostock Ward, was cordially thanked for his past services, and unanimously invited to allow himself to be nominated again. This he consented to do; and he gave a short *résumé* of his work during the year. A Committee was appointed to further his candidature; and he has been returned unopposed.

A meeting of the creditors of the Hella Bushlight and Methane Gas Company, Limited, was recently held at the London offices, under the presidency of Mr. C. F. Killar, the Liquidator. The unsecured liabilities totalled about £1100, and the assets consisted of book debts estimated to produce something like £10, fixtures worth about £25, and the patents of the "Bushlight" and methane gas; while there was another asset in respect of unpaid calls on 8000 preference shares, amounting to £3100—£4900 having already been paid. The present position was said to be principally due to the failure to complete unpaid calls. Mr. Killar said that if this amount was paid there would be more than sufficient in the assets to pay 20s. in the pound. He had no offer to make; but he suggested that the creditors should leave the matter in his hands, and he would endeavour to secure the balance of unpaid calls without resorting to legal action. It was decided to do this. Among the creditors are the Wholesale Fittings Company, Limited, for £32, and the Pneumatic Gas Lighting Company, Limited, for £11.

Paris Water Supply.—Referring to this subject last Friday, the "Engineer" said: "After the experience of the past summer, when the supply of water fell considerably below the consumption, the Paris Municipal Council decided that it was time to take energetic measures to avoid the possibility of any such dearth in the future. Parisians claim that, as they have spent such huge sums of money upon works for bringing water to the city, there is no excuse for cutting off the supplies when the consumption exceeds the normal. Consequently, a series of schemes, which three years hence will increase the daily supply by 220,000 cubic metres, is under consideration. New filtering and sterilizing beds are to be made at St. Maur, where the supply will be augmented by 80,000 cubic metres, and more water is to be carried through the Loing aqueduct, so that next year there will be a total addition of 100,000 cubic metres at a cost of only 1,200,000 frs. An aqueduct is to be built for the Voulzie basin, which will carry 60,000 cubic metres; but this will occupy three years in construction, and will cost 18,000,000 frs. The capacity of the Ivry filter-beds is to be doubled by passing the water through more quickly; while new pumping-engines are to be laid down, so that the supply will be increased from 60,000 to 120,000 cubic metres. The water will be chemically sterilized, as was the case at the St. Maur pumping-station during the late water famine. It is expected that all these improvements will allow of a sufficiently abundant supply to meet all contingencies without it being necessary to resort to more costly projects."

Coventry Water Supply.—The Coventry Corporation have been unable for some time to use the water drawn from the Whitley well, in consequence of its contamination. Owing, however, to the arrangements made with the Birmingham Corporation for the supply of a certain quantity of water from their Shustoke reservoir, there has been no shortage despite the exceptionally dry summer. The Water Committee and the Water Engineer (Mr. J. E. Swindlehurst), anxious to ascertain the cause of the pollution of the well, have caused a number of trial holes to be made in the vicinity, with the result, aided by a report from Professor Lapworth, that they have come to the conclusion that the contamination has arisen from the feeding and rearing of cattle upon neighbouring land. The Committee have accordingly arranged with the occupier of the farms in question to surrender his tenancy on receiving a payment of £750. Alderman Drinkwater, the Chairman of the Committee, laid emphasis on the fact that Coventry ought not to make itself entirely dependent upon Birmingham for its water supply, even though they had made liberal provision in this respect. He reminded the Council that there might be at any time a mishap to mains, or some other accident, which would interfere with the regular supply. Moreover, they had valuable machinery at the Whitley works; and it was very desirable that, if possible, the water supply there should be rendered perfectly pure for domestic use. In addition to this, they had the population of the city growing very rapidly; and it was essential that the authorities should be in a position to meet all demands satisfactorily. The Council, with unanimity, adopted the recommendation of the Committee.



SIMPLICITY, Economy in Maintenance and Interchangeability is the key to the continued success of the "A. B. C." Series, which consist of

18 Sizes. 5 Designs. All Parts Standardized and Interchangeable.

Only one set of parts for each width of fire required for renewals and repairs.

THE RICHMOND GAS STOVE & METER CO., Ld.,
GASFIRE SPECIALISTS.
Offices & Show-Rooms: 132, Queen Victoria St., LONDON, E.C.
Offices & Works: Academy St., WARRINGTON.

Inventors of the Interchangeable "A B C" Series of Gasfires, Patent Combined Gas-Air Adjuster and Governor, Air-Pad, Fire Brick, &c.

Electric Light Failures.—About the time the results of the municipal elections were being announced in the Blackpool Town Hall last Wednesday, the electricity supply in the principal corridor of the building suddenly failed. Pending the restoration of the electric light, candles were requisitioned, and some of the business was carried on in semi-darkness. One of the gentlemen present remarked: "Smart business men we have got on the Council. Here the electric supply has suddenly failed, and there is no gas in the place." Some considerable time elapsed before the light was switched on again. Worshippers in the churches at Eastbourne last Sunday night week had an unusual experience. During the sermon the electric lights waned, and, getting gradually dimmer, eventually disappeared—leaving the congregations and the preachers in total darkness.

The Double Fatality at a Chemical Works.—In the "JOURNAL" last week (p. 327), a brief account was given of a fatal accident at the works of Messrs. Forbes, Abbott, and Lennard, at East Greenwich; one man (Samuel Berry) being overpowered while at work at the bottom of an ammonia tower 30 or 40 feet high, and another (George Groves) losing his life in an attempt to rescue his fellow-workman. At the inquest held by Mr. H. R. Oswald, at which Mr. J. E. Harston, one of the Inspectors of Factories, and Mr. F. Napier Sutton, a District Inspector under the Alkali Acts, were present, evidence was adduced which showed that since the accident it had been discovered that a pipe connected with a tank was defective, and that in consequence sulphuretted hydrogen found its way into the tower. It was stated that there were three precautionary measures against foul gases getting into the tower—two water-seals and a valve on the outlet-pipe. The valve was found to be open; and it was the duty of Groves to see that it was closed. The Jury returned a verdict of "Accidental death," and expressed the opinion that the accident was due to the negligence of the Company in placing an incompetent man in charge of the tower; and that the opening at the top was inadequate for working purposes. Mr. S. G. Sprent, on behalf of the Company, contended that there was no evidence to justify the first part of the rider. He expressed regret at the accident, and sympathy with the relatives in the loss they had sustained. The Company also wished to place on record their sense of the heroic conduct of Groves. The Coroner said everyone would agree with this.

The Institution of Water Engineers has been registered as a Company limited by guarantee. The offices are at No. 54, Parliament Street, Westminster.

"The Art and Science of Paper-Bag Cookery" is the subject of an illustrated article in our bright little American contemporary "Gas Logic" for the past month.

Water, Gas, and Power Undertakings, Limited, is the title of a Company which has been registered with a capital of £4000, in £1 shares, to construct, maintain, develop, and control water and gas works, reservoirs, heat and light supply works, &c.

The Directors of the Continental Union Gas Company, Limited, have decided to recommend, at the general meeting to be held on the 5th prox., dividends of 2 per cent. for the half year on the ordinary stock, free of income-tax and of 3½ per cent. for the half year on the preference stock, less income-tax; making for the year 4 per cent. on the former, and 7 per cent. on the latter.

The Hayfield Rural District Council have adopted an amended scheme of water supply for the village of Mellor, the estimated cost being £7600, which includes the purchase of the private water-works belonging to Mr. F. C. Arkwright. It has been decided by the Council to ask the Local Government Board, in granting powers for a loan in carrying out the scheme, to extend over fifty years the period for its repayment.

We have received from Messrs. J. & W. B. Smith, of Farringdon Road, E.C., a copy of their new shop-lighting supplement. It shows all the most up-to-date lamps for indoor and outdoor lighting—including the "Silva," "Graetzin," and "Imperial"—a number of fittings suitable for inside shop lighting, "Glasmi" mantles, shades, &c. Messrs. Smith will supply these lists to gas companies with their name printed thereon instead of that of the firm.

In previous issues of the "JOURNAL," reference has been made to the lectures on cookery given by Miss Edith M. Smith for the Gas Committee of the Burton-upon-Trent Corporation in the Burton Town Hall. A *résumé* of the lectures has been prepared in the form of a neat folding leaflet, bearing the title "How to Make the Best Use of Gas Cooking-Stoves;" and it is being issued with other literature on the heating of baths, motor-houses, greenhouses, &c., by gas.

It is recorded in the "Co-Partnership Journal" of the South Metropolitan Gas Company for the present month that on the 23rd of September a bottle was picked up on the seashore at Foz do Adellio, Portugal, containing the following message, which the finder kindly sent to the Company's chief office: "Whoever finds this please send to Old Kent Road Gas-Works, London, S.E., England. Co-partners on board bound for Australia going well.—Furminger, Aug. 8, 1911."

Among recent orders with which Messrs. Joseph Taylor and Co., of Bolton, have been favoured, is one for a solid plate lead saturator of their best make, fitted with double detachable ammonia pipes, &c., including the whole of the leadwork in connection with the new sulphate plant at the works of the Leven and Methil Gas Company; another for a large saturator, fitted with plate lead well for ejecting steam, including acid tanks, &c., for Messrs. Simon-Carvès, Limited, Manchester, for a large coke-oven plant; and also one for one of their best makes of saturators for the Whitworth Vale Gas Company.

The saving of time is of importance in every business; and as it means a saving of money, it is specially worthy of attention just now when rates and taxes are high, and workpeople demand shorter hours and increased pay. To get every minute from every employee each day is a necessity with the modern man of business. In a neat illustrated booklet issued by the International Time Recording Company, of the City Road, E.C., pictorial evidence is furnished in regard to what the Bundy, International, and Rochester automatic time recorders are doing in the way of guarding minutes all over the world.

FIRES
and
RADIATORS
FOR ALL REQUIREMENTS.

THE "CRETAN."

One of The P. S. C. Series.

The Popular Priced Fires.

See New Season's Booklet for Full Particulars.

PARKINSON

The "COMET."

A Luminous Flame Radiator, built on the sectional principle.
Supplied in various Finishes.

THE
PARKINSON STOVE CO., LTD.
(Incorporating Maughan's Patent Geyser Co.),
BIRMINGHAM & LONDON.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments Vacant.

ENGINEER AND MANAGER. Wilmslow and Alderley Edge Gas Company. Applications by Nov. 13.
GAS ENGINEER. City Commissioners, Edmonton, Alberta, Canada.
MANAGER (Gas and Water). Atherton Urban District Council. Applications by Nov. 22.
DRAUGHTSMAN. No. 5477.
REPRESENTATIVE (Gas-Stove Trade). John Wright and Co., Birmingham.
TRAVELLERS OR REPRESENTATIVES. Universal, 44, Gray's Inn Road, London.
JUNIOR CLERK. Dorking Gas Company.
FITTERS. Cardiff Gas Company.
GAS-FITTER, &c. Oswestry Gas Company.

Appointments Wanted.

REPRESENTATIVE (Lamps and Fittings, &c.). No. 5474.
MANAGER (Ammonia Products, &c.). No. 5475.
ASSISTANT GENERAL MANAGER (Gas-Stove Trade). No. 5476.

Appointments Wanted (*continued*).

CHEMICAL PLUMBER. No. 5450, c/o Mr. King, 11, Bolt Court, Fleet Street, E.C.
REPRESENTATIVE. No. 5469.
POSITION WITH ENGINEER (Carbonization, Verticals, &c.). No. 5468.

Books (Second-Hand) Wanted. No. 5465.

Plant, &c. (Second-Hand), for Sale.

RETORTS, CONDENSERS, ROTARY METER, WASHER. PIPES AND BENDS. Wolstanton Gas Department, Tenders by Nov. 20.

Stocks and Shares.

ALDERSHOT GAS, WATER, AND DISTRICT LIGHTING COMPANY. By Auction. Nov. 28.
CLEETHORPES GAS COMPANY. By Auction. Nov. 17.
HERNE BAY GAS AND COKE COMPANY. By Auction. Nov. 28.

Stocks and Shares (*continued*).

HYTHE AND SANDGATE GAS COMPANY. By Auction. Nov. 28.
LITTLEHAMPTON GAS COMPANY. By Auction. Nov. 15.
SOUTHEND WATER-WORKS COMPANY. By Auction. Nov. 28.
TENDRING HUNDRED WATER-WORKS COMPANY. By Auction. Nov. 28.

TENDERS FOR

Coal and Cannel.

LLANDUDNO URBAN DISTRICT COUNCIL. Tenders by Nov. 18.

Fire-Clay Goods.

BRADFORD CORPORATION. Tenders by Nov. 23.
SHEFFIELD UNITED GASLIGHT COMPANY. Tenders by Dec. 1.

TAR PRODUCTS PRICES.

Representative manufacturers give the following as fair current values for the week ending Nov. 4. Prices are net, and they include the usual packages and delivery f.o.b., f.a.s., or f.o.r., as customary.

Article.	Basis.	London.	North-East Coast.	East Coast, Yorks.	West Coast.		Glasgow.
					Liverpool.	Manchester.	
Tar, crude	per ton	—	20/6 25/-	21/- 25/-	—	21/- 25/-	—
Pitch	"	42/6	40/-	40/6	40/-	39/3	40/-
Benzol, 90%	per gallon	1/3	-/11¼	-/11½	—	-/10	-/11
Benzol, 50-90%	"	—	-/11⅛	-/9⅝	—	-/9⅝	—
Toluol, 90%	"	—	-/11⅛	-/9⅝	-/10	-/10¼	-/10¾
Crude naphtha, 30%	"	—	-/4⅝	-/4½	-/3¾	-/4	—
Light oil, 50%	"	—	-/3⅞	-/3¾	-/3½	-/3⅝	—
Solvent naphtha, 90-160	"	—	-/10¾	-/10	-/10	-/10	-/11½
Heavy naphtha, 90-190	"	—	-/11	-/11	-/11¼	-/11⅜	-/11½
Creosote in bulk	"	-/3	-/2⅝	-/2⅝	—	-/2⅝	-/2
Heavy oils	"	—	-/2⅝	-/2½	-/2¾	-/2¾	-/2¾
Carbolic acid, 60's	"	2/5	2/2½	2/2	—	2/1	2/2
Naphthalene, crude drained salts	per ton	—	45/-	42/6	47/6	47/6 50/-	—
" pressed	"	—	62/6	63/-	60/-	60/- 75/-	—
" whizzed	"	—	—	—	70/- 72/6	65/- 75/-	62/6
Anthracene	per unit	-/2	-/1½	-/1½	-/1½	-/1½	—

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 370.

Issue.	Shares.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 12	5	Alliance & Dublin Ord.	79—82	..	6 1 11
374,000	Stk.	July 14	4	Do. 4 p.c. Deb.	93—95	..	4 4 8
250,000	5	Sept. 28	7	Bombay, Ltd.	6—6½	..	5 7 8
50,000	10	Aug. 31	15	Bourne-) 10 p.c.	28½—29⅜	..	5 1 8
311,810	10	"	7	mouth Gas) B 7 p.c.	16½—16¾	..	4 3 7
75,000	10	"	6	and Water) Pref. 6 p.c.	14¼—14½	..	4 1 4
380,000	Stk.	Aug. 16	13	Brentford Consolidated	256—261	..	4 19 7
330,000	"	"	10	Do. New	198—203	..	4 18 6
50,000	"	"	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
206,250	"	June 15	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
220,000	Stk.	Aug. 31	11	Brighton & Hove Orig.	217—222	..	4 19 1
246,320	"	"	8	Do. A Ord. Stk.	156—159	..	5 0 8
490,000	20	Sept. 28	12½	British	44½—45½	..	5 9 11
120,000	Stk.	June 30	4	Do. 4 p.c. Deb. Stk.	94—96	..	4 3 4
109,000	"	Aug. 16	6	Bromley, A 5 p.c.	117—122	..	4 18 4
165,700	"	"	4½	Do. B 3½ p.c.	90—92	..	4 17 10
82,278	"	"	5½	Do. C 5 p.c.	105—110	..	5 0 0
55,000	"	June 30	3½	Do. 3½ p.c. Deb.	82—84	..	4 3 4
250,000	Stk.	"	4	Buenos Ayres 4 p.c. Deb.	95—97	..	4 2 6
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4—5	..	—
100,000	Stk.	June 30	4½	Do. 4½ p.c. Deb. Stk.	80—83	..	5 8 5
157,150	Stk.	Aug. 16	5	Chester 5 p.c. Ord.	107—109	..	4 11 9
1,513,280	Stk.	"	5/9/4	Commercial 4 p.c. Stk.	110—112	..	4 17 7
560,000	"	"	5½	Do. 3½ p.c. do.	105—107	..	4 19 8
475,000	"	June 15	3	Do. 3 p.c. Deb. Stk.	76—78	..	3 16 11
800,000	Stk.	May 31	4	Continental Union, Ltd.	90—95	..	4 4 3
200,000	"	"	7	Do. 7 p.c. Pref.	135—137	..	5 2 2
492,270	Stk.	—	5½	Derby Con. Stk.	122—124	..	4 8 9
55,000	"	—	4	Do. Deb. Stk.	104—105	..	3 16 2
840,150	10	July 28	10	European, Ltd.	19—20	..	5 0 0
16,160,600	Stk.	Aug. 16	4/14/8	Gas-) 4 p.c. Ord.	104½—105½	..	4 9 9
2,600,000	"	"	3½	light) 3½ p.c. max.	84½—86½	..	4 0 11
4,062,235	"	"	4	and) 4 p.c. Con. Pref.	102—104	..	3 16 11
4,531,705	"	June 15	3	Coke) 3 p.c. Con. Deb.	80—82	..	3 13 2
258,740	Stk.	Sept. 14	5	Hastings & St. L. 3½ p.c.	94—96	..	5 4 2
82,500	"	"	6½	Do. do. 5 p.c.	—	..	—
70,000	10	Oct. 12	11	Hongkong & China, Ltd.	17—17⅞	..	6 5 9
131,000	Stk.	Sept. 14	7½	Ilford A and C	152—155	..	4 16 9
65,780	"	"	6	Do. B	123—126	..	4 15 3
65,500	"	June 30	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
4,940,000	Stk.	May 12	9	Imperial Continental	185—188	+2	4 15 9
1,235,000	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.	90—92	..	3 16 1
200,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c.	125—130	..	4 12 4
561,000	Stk.	Aug. 16	10	Liverpool United A.	217—219	..	4 11 4
718,100	"	"	7	Do. B.	164—166	..	4 4 4
306,083	"	June 30	4	Do. Deb. Stk.	102—104	..	3 16 11
75,000	5	June 15	6	Malta & Mediterranean	4⅞—5⅛	..	5 17 1
560,000	100	Oct. 2	5	Met. of) 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	"	4½	Melbourne) 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	May 31	3½	Monte Video, Ltd.	12⅝—13	..	5 7 8
1,775,892	Stk.	July 28	4½	Newc'tle&G'tesh'd Con.	102—103	..	4 5 0
529,705	Stk.	June 30	3½	Do. 3½ p.c. Deb.	87—89	..	3 18 8
55,940	10	Aug. 31	7/7/0	North Middlesex 7 p.c.	14⅜—15½	..	4 14 10
300,000	Stk.	Apl. 27	8	Oriental, Ltd.	135—140	..	5 14 4
60,000	5	Sept. 28	8	Ottoman, Ltd.	6⅜—7	..	5 14 4
31,800	53	Aug. 16	13	Portsea Island A	140—145	+5/8	4 14 10
60,000	50	"	13	Do. B	133—138	+9/8	4 14 2
100,000	50	"	12	Do. C	130—135	+9/8	4 8 11
398,490	5	Oct. 12	8	Primitiva Ord.	7⅞—7⅞	+⅛	5 4 11
796,980	5	June 30	5	Do. 5 p.c. Pref.	5⅛—5⅝	..	4 13 0
488,900	100	June 1	4	Do. 4 p.c. Deb.	97—99	..	4 0 10
312,650	Stk.	June 30	4	River Plate 4 p.c. Deb.	95—97	..	4 2 6
250,000	5	Sept. 28	12	San Paulo, Ltd.	10½—11	..	5 9 1
115,000	10	"	6	Do. 6 p.c. Pref.	12—12½	..	4 16 0
125,000	50	July 1	5	Do. 5 p.c. Deb.	50—51	..	4 18 0
135,000	Stk.	Aug. 31	10	Sheffield A	238—240	..	4 3 4
209,984	"	"	10	Do. B	238—240	..	4 3 4
523,500	"	"	10	Do. C	238—240	..	4 3 4
90,000	10	Sept. 28	6	South African	8—9	..	6 13 4
6,429,895	Stk.	Aug. 16	5/9/4	South Met., 4 p.c. Ord.	116—118	..	4 12 8
1,895,445	"	July 14	3	Do. 3 p.c. Deb.	79—81	..	3 14 1
209,820	Stk.	Aug. 16	8½	South Shields Con. Stk.	154—156	+2	5 9 0
605,000	Stk.	"	5⅝	S'th Suburb'n Ord. 5 p.c.	119—121	+1	4 13 6
60,000	"	"	5	Do. 5 p.c. Pref.	115½—117½	..	4 5 1
117,058	"	July 14	5	Do. 5 p.c. Deb. Stk.	121—123	..	4 1 4
502,310	Stk.	May 12	5	Southampton Ord.	108—110	..	4 10 11
120,000	Stk.	Aug. 16	7⅛	Tottenham) A 5 p.c.	145—148	..	4 16 3
483,940	"	"	5⅛	and) B 3½ p.c.	115—117	..	4 16 1
149,470	"	June 15	4	Edmonton) 4 p.c. Deb.	96—98	..	4 1 8
182,380	10	June 15	8	Tuscan, Ltd.	8⅞—9¼	..	8 13 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	96—98	..	5 2 0
236,476	Stk.	Aug. 16	5	Tynemouth, 5 p.c. max.	113—115	..	4 6 11
255,636	Stk.	Aug. 31	6⅞	Wands-) B 3½ p.c.	142—145	..	4 14 10
85,766	"	June 30	3	worth) 3 p.c. Deb. Stk.	71—73	..	4 2 2

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d, Payable in advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, LONDON, E.C. "Volcanism, London."

TAR WANTED.

THOMAS HORROCKS & SONS, LTD.,
Albert Chemical Works, BRADFORD,
MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Sulphate of Ammonia.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by
CHANCE AND HUNT, LIMITED,
Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS.
Telegrams: "CHEMICALS, OLDBURY."

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Oct. 3, p. 9.

ENQUIRIES SOLICITED.

FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS,
C. & W. WALKER, LIMITED,
DONNINGTON, NEWPORT, SALOP.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, SUNDERLAND, AND WAKEFIELD.

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 5d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d. "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 943 Holborn.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS BOLTON.
Telegrams: "SATURATORS, BOLTON." Telephone 0848.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

OXIDE OF IRON (BOG ORE)
ANY QUANTITY. ANY PORT. ANY STATION.
DONALD M'INTOSH,
110, CANNON STREET, LONDON.

DUTCH OXIDE OF IRON.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

THE First Dutch Bogore Co., Ltd.,
NYMEGEN, HOLLAND.
General Manager (for England and Wales)—
W. T. P. CUNNINGHAM,
13, Arcadian Gardens, Wood Green, LONDON, N.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 years. References given to Gas Companies.

COAL TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers.
Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, SUNDERLAND, AND WAKEFIELD.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

A BIG profit for Agents.—Agents wanted to make good money selling "Frugals"—the wonderful gas-savers. Every private and business house needs them; liberal Profits. Write at once for Terms and Particulars. LEFTWICH & Co., Gas Lighting Dept., 34, James Street, Camden Town, LONDON, N.W.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO., LTD., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, SUNDERLAND, and WAKEFIELD.

SULPHURIC ACID — Specially prepared for Sulphate of AMMONIA and BENZOL Recovery Plants. JOHN NICHOLSON & SONS, LTD., Hunslet Chemical Works, LEEDS. Tele.: "NICHOLSON, LEEDS." Telephone: (Two lines), Nos. 2420 and 2421.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Church Fenton, near LEEDS.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the *best*. Satisfaction Guaranteed.

AMMONIA.
Consumers in any form are invited to correspond with CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.

BROTHERTON & CO., LIMITED.
Offices: City Chambers, LEEDS.
Correspondence invited.

OXIDE OF IRON.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
"KLEENOFF," THE COOKER CLEANER.
BALE & CHURCH, LTD.,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 1588 AVENUE (3 lines).

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS,
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

AMMONIA Waste Liquor Disposal.
Purification Plant.
Results Guaranteed. No Working Costs.
JOHN RADCLIFFE, Chemical Engineer, EAST BARNET.

TAR WANTED.

BURNDEN Tar Company (Bolton), Ltd.
Telephone: 258 Bolton. Telegrams: "Tar Bolton."
HULTON CHEMICAL WORKS, BOLTON.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the enrichment of Gas.
Manufactured and supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agent, F. J. NICOL, Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

WITHERS & SPOONER, Chartered Patent Agents. British, Foreign, and Colonial Patents, Trade Marks and Designs, obtained at fixed and moderate charges. Every description of business connected with Patents undertaken. Send for free copy of our "GUIDE TO PATENTS," giving full information and fees.—323, High Holborn, LONDON.

AMMONIACAL Liquor wanted.
CHANCE AND HUNT, LTD., Chemical Manufacturers, OLDBURY, WORCS.
Telegrams: "CHEMICALS."

FOR Instructions on Polishing and Cleaning Gas-Cookers and Gas-Fittings, read Canning Handbook on Polishing, Electro-Plating, and Lacquering. Fully illustrated. Price 2s. 3d., post free; abroad, 2s. 6d.
W. CANNING AND CO., BIRMINGHAM, and 18 to 20, St. John's Square, Clerkenwell, LONDON, E.C.

WANTED, Second-Hand Recent Editions of NEWBIGGING'S, HUNT'S, BUTTERFIELD'S, HERRING'S Granton Works, HORNBY'S Gas Manufacture, and other GAS BOOKS; also bound Volumes of the "JOURNAL," 1900 to 1905.
Full Particulars to No. 5465, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

No. 5444

APPLICANTS for the Situation appearing under this number are informed that, owing to the serious illness of the Manager, the matter of making the Appointment HAS HAD TO REMAIN IN ABEYANCE, and it may be a few weeks yet before he is well enough to deal with the same.
Nov. 3, 1911.